AUTOMOTIVE INDUSTRIES

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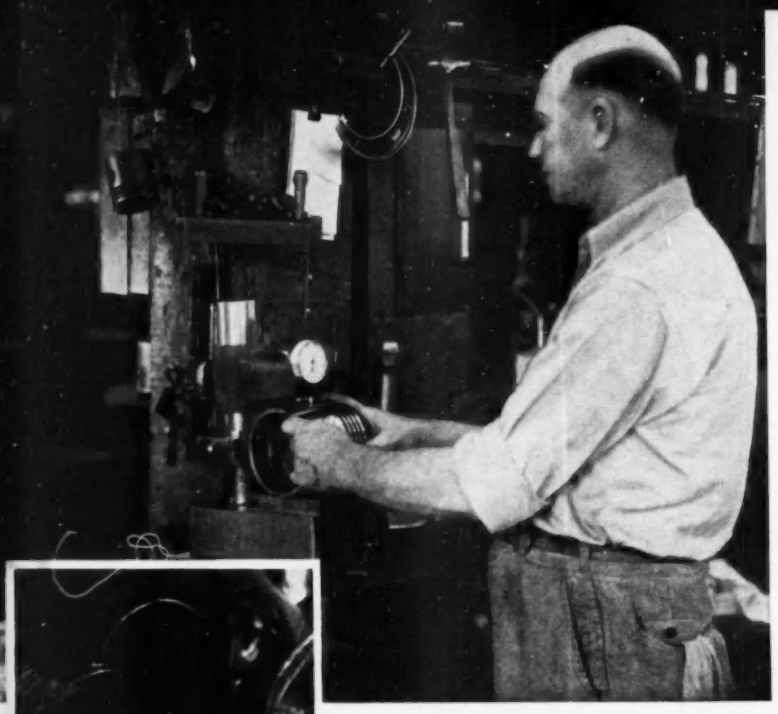
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT

ENGINEERING • PRODUCTION • MANAGEMENT

MARCH 1, 1950

In This Issue . . .

A CHILTON PUBLICATION



SUPERLA Soluble Oil

Gets double-barreled saving in piston grinding

The Job: Cylindrical grinding of cast-iron automotive pistons.

Machines: Six Norton Grinders.

Aiming at higher production and economy, a midwest plant tried various soluble oils on the job described above. Of the products tried, SUPERLA Soluble Oil proved superior to any and helped this plant reach its goal through these benefits:

Fewer wheel dressings—70 to 80 pistons are produced before wheels need dressing, as compared with an average of 30 to 40 pistons obtained with other soluble oils. This amounts to a big saving through reduced time and labor for dressing wheels.

Greater production—Less interruption for wheel maintenance adds approximately 40 minutes to the daily production time of each machine.

These additional advantages of using SUPERLA Soluble Oil are reported by the shop foreman: piston diameters kept within a tolerance of .0005 to .001 inch, no rusting troubles, no soluble-oil rancidity or odor troubles.

The experience of this plant indicates the savings you can make with SUPERLA Soluble Oil, not only on cast-iron jobs but on a wide variety of operations. Such product benefits, moreover, are multiplied by Standard Oil's engineering service which puts at your immediate disposal the help of an experienced lubrication specialist. How you as a midwest manufacturer can profit by this product-service combination is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

Whether your problem is one of obtaining greater production or higher product quality, there's a Standard Oil lubricant or cutting oil that can help you reach that goal. Moreover, there's a Standard Oil man who will work right with you until that goal is attained. This man is one in the corps of Standard Oil lubrication and cutting oil specialists throughout the Midwest. You'll find him at the nearest Standard Oil Company (Indiana) office. His experience and special training will help you get maximum benefits from such outstanding products as:

STANICUT Cutting Oils—These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades varying in viscosity are available, each containing the correct proportion of extreme-pressure and anti-weld ingredients.

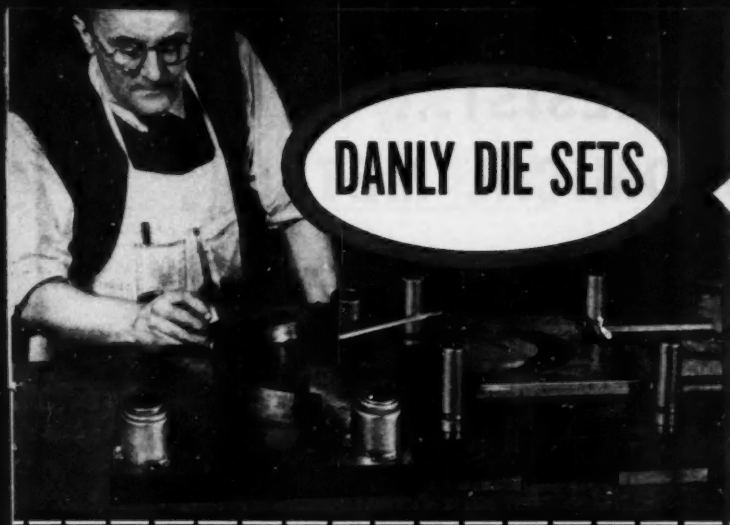
STANOSTAMPS—Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical application. STANOSTAMPS offer maximum protection for dies and work, can be readily removed in conventional washing equipment.

STANDARD Quenching Oil—From Standard Oil's complete line of quenching oils, this product is recommended for general quenching work in systems provided with suitable cooling arrangements. It is a light-bodied oil of pale color that offers high quenching speed and minimum deterioration in continuous use.

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA Greases—Available in lime soap and soda soap types, SUPERLA Greases cover a wide range of applications. These products are comparable in quality to the highest type of special greases but are as readily available and economical as ordinary cup greases.

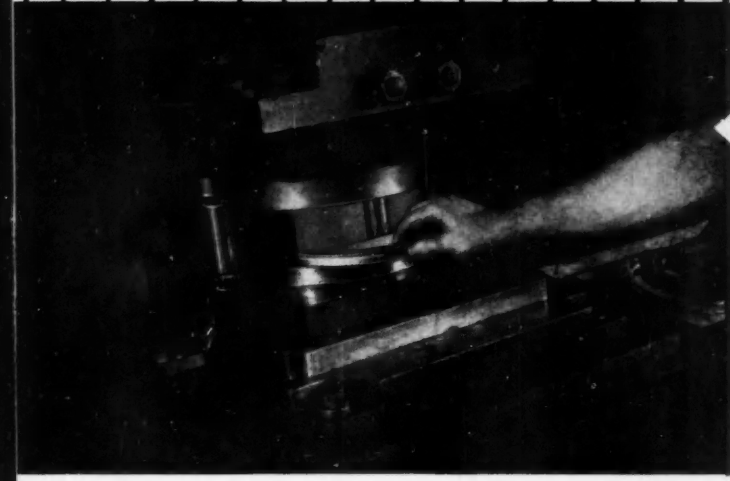
STANDARD OIL COMPANY (INDIANA) STANDARD



DANLY DIE SETS

less time

IN THE DIE SHOP



longer life

ON THE PRODUCTION LINE

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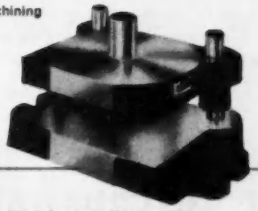
. . . featuring Danly Precision Die Sets and Tool, Die and Gage Makers' Supplies

Danly precision makes every Danly Die Set a reliable foundation for the finest die work. And in addition to the performance advantages they assure, Danly Die Sets are quickly available, too, from a nation-wide system of completely stocked assembly branches.

Large or small, standard or special, there's a Danly Die Set to meet every tooling need. Just contact your nearest Danly branch for fastest delivery of the best in die sets.

WRITE FOR FREE BULLETIN

. . . and see how Danly's special die set machining service can help reduce your costs.



DANLY®

DANLY MACHINE SPECIALTIES, Inc. 2100 South 52nd Avenue, Chicago 50, Illinois

OVER 25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

NI-RESIST...
AN ECONOMICAL METAL

for resisting Corrosion, Erosion and Metal-to-Metal Wear

NI-RESIST* is the trade name of a high nickel cast iron – one of the most economical corrosion-resistant engineering materials ever developed.

NI-RESIST, mechanically similar to gray iron, and resembling austenitic stainless steel in many characteristics, provides a unique combination of properties at moderate cost . . .

RESISTS CORROSION

NI-RESIST resists corrosive attacks of *acids*, *alkalies* and *salts* to a degree unmatched by any other product of the cast iron industry. In strong corrosives it has 20 to 200 times the resistance of plain iron, and 5 to 50 times the resistance in mild environments.

CURBS WEAR

NI-RESIST reduces wear and galling, because graphite particles are distributed throughout its structure, as in gray iron. From this, and its work-hardening characteristics, come the superiority of NI-RESIST castings for components in metal-to-metal wear service.

CHECKS EROSION

This superior wear-resistance . . . together with inherent resistance to corrosion . . . makes NI-RESIST an outstanding material for curbing erosion by liquids and slurries. By long, trouble-free control of erosion, NI-RESIST castings reduce maintenance costs, production tie-ups and the expense of replacements.

WITHSTANDS HEAT

Although primarily used to resist corrosion, erosion and metal-to-metal wear . . . NI-RESIST is also specified for resistance to elevated temperature effects. Castings of NI-RESIST show up to 10 times better scaling resistance, and up to 12 times better growth resistance than those of plain iron at 1300 to 1500°F.

MACHINABILITY and OTHER PROPERTIES

NI-RESIST of normal hardness machines like 200 BHN gray iron and is readily weldable.

NI-RESIST has high specific electrical resistance. Thermal expansion can be controlled, from 60 per cent higher than that of plain iron to a low approximating that of Invar.

NI-RESIST is usually lower in cost than most other corrosion-resistant alloys. It is produced by authorized foundries only, in all industrial centers of the country. NI-RESIST castings have no more limitations in size and complexity than those of any gray iron.

APPLICATIONS

Several types of NI-RESIST *are available. All provide the fundamental properties described above, and differ only in certain special characteristics to meet a variety of industrial demands.*

Applications include: Salt filter drums, oil refinery tube supports and headers, turbine nozzle rings, cylinder liners, valves and fittings, furnace rollers, textile rolls, comminuter parts, blow pit pipes, precision machine tool spindle heads, bridge, and work supports, magnet housings, sugar retorts, etc.

FULL INFORMATION

May we send you two booklets? One, entitled, "Engineering Properties and Applications of NI-RESIST," includes corrosion data on NI-RESIST and cast iron under 400 different corrosive conditions. The other, entitled, "Buyers' Guide for NI-RESIST Castings," lists producers of NI-RESIST castings. Both are yours for the asking. Write for them today.

*Reg. U. S. Pat. Off.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

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Contents

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VERS-O-TOOL—THE STANDARD

At Addressograph-Multigraph

FOR THIS CLASS OF WORK

VERS-O-TOOL FEATURES

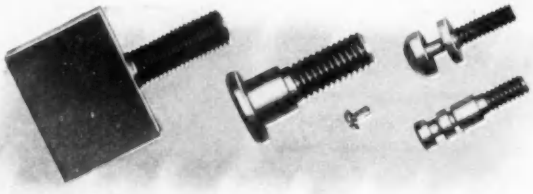
1 Threading close to shoulders and positive quick opening action are characteristics of DBS die heads, built especially for Brown & Sharpe Automatics.

2 Circular chasers are always up to correct position—assuring precision threads and smooth finish.

3 Accuracy of thread form is assured throughout the life of a circular chaser, by means of direct micrometer check after each regrind.

4 Vers-O-Tool circular chasers are regrindable through a full 270°—an exclusive feature, for longer life.

5 Circular ground thread chasers are available in a full range of thread sizes—even down to 260 TPI.



In the modern Addressograph-Multigraph plant at Cleveland, Style DBS Vers-O-Tools are used *exclusively* for the vast quantities of threaded parts that flow from their battery of more than 60 Brown & Sharpe Automatics.

Here's why: the parts produced are largely adjustment-making screws used on their products. Thread uniformity and smooth finish are extremely important—there's no room for gradual deterioration of quality toward the end of the lot.

That's where Vers-O-Tools shine. Addressograph-Multigraph find they get 7,000 to 10,000 precision threads per chaser grind.

But that's only part of the story. Lower chaser costs, less tool inventory, faster production—all of these enter in. For complete details on how Vers-O-Tools can cut threading costs in *your* shop, ask for catalog D-49.

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Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

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Rolling finer Alloy Bars at 27 miles per hour

This continuous, high-speed 10-inch mill is the most advanced bar-rolling equipment in operation today. A mechanical marvel, it can reduce a billet to a finished bar in approximately 20 seconds. The hot steel travels continuously in a straight line from the furnace all the way through 18 roll stands to the run-out table with no reversing or looping-back required.

There are four principal reasons why this mill produces alloy steel bars of superior quality.

1. Alternate vertical and horizontal rolls in the roughing stands are arranged to eliminate any twisting or deflection in the bars.

2. Guides are designed to avoid scratching or damaging the surface of the bars between passes.

3. The heating furnaces that feed into the mill are designed to hold billets at rolling temperature for relatively short periods, resulting in less scale and decarburization.

4. The high rolling speeds minimize the temperature drop and help to develop a uniform tolerance and section in the finished bars.

This mill is typical of the many postwar improvements Bethlehem has made in its facilities for producing alloy steels. Also included are: modern soaking pits, hot scarfing machines, controlled-cooling facilities, heat-treating furnaces for bars in straight lengths and coils, and finishing facilities.

Bethlehem makes high-quality alloy steels in a complete range, including all AISI grades and special analyses for every purpose.

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BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

THE CONVAIR B-36 with a service-ceiling above 40,000 feet requires materials that withstand temperatures ranging from −100° to +500°F.

that's why SILASTIC*

the Dow Corning Silicone Rubber is used in so many places where rubber-like properties must be retained for long periods of time at temperatures far above and below the limits of any organic rubber.

SILASTIC gaskets reinforced with glass cloth used as a seal in cabin heating and pressurizing system. Operating temperatures in the range of −70° to 400°F.

SILASTIC boots used to increase the reliability and to prevent corrosion and untimely shorting of limit control switch made by Exhibit Supply Company. Retain their strength and flexibility over entire operating span of −100° to +170°F.

SILASTIC gaskets reinforced with glass cloth used to seal rocker arm housing in Pratt and Whitney Wasp Major engines. Withstand hot oil at operating temperatures in the range of 450°F.

SILASTIC seals for bomb bay doors and for cover plates, doors and windows in camera bays, retain their strength, resilience and flexibility at temperatures ranging from −100° to +160°F.

For more data on Silastic phone our nearest branch office or write for New Silastic Facts, data sheet B-14.

*T.M. Reg. U.S. Pat. Off.

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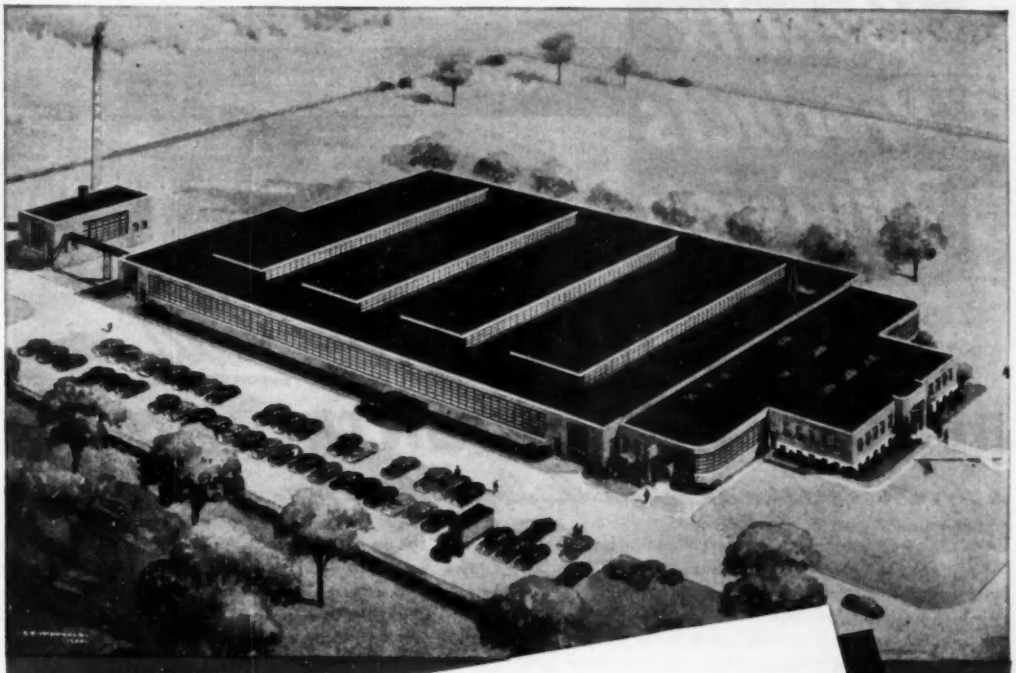
Dow Corning

FIRST IN SILICONES



EATON MANUFACTURING COMPANY
Cleveland, Ohio

Announces the Opening of the New Plant of its Subsidiary

EATON AUTOMOTIVE PRODUCTS, LIMITED
London, Ontario, Canada

EATON

AUTOMOTIVE HEATERS AND HEATING-VENTILATING SYSTEMS • TAPPETS
DIFFERENTIAL 2-SPEED AXLE HEADS • SCREW MACHINE PRODUCTS
INDUSTRIAL LOCK WASHERS • SPRINGTITES

Bendix Products Division

CREATIVE ENGINEERING

GEARED TO QUANTITY PRODUCTION

ANNOUNCES THE *New*

BENDIX HAND CONTROL VALVE

Finer Performance At A Lower Cost than Ever Before!

Here is the valve that gives truckers the ultimate in hand controls for vacuum braking systems—but *costs even less* than ordinary models. The new Bendix Hand Control Valve is a simple, rugged unit with a clean, modern appearance that adds to the good looks of any cab interior. Its absolute dependability and consistent precision set an all time high for performance—and at a lower cost than ever before! Available with or without an integral, easy-to-read vacuum gauge, the new Bendix Hand Control Valve assures maximum flexibility with today's vacuum trailer braking assemblies. For complete details write the factory direct.

BENDIX · PRODUCTS DIVISION · **SOUTH BEND**

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

GRADUATES ACCURATELY

The new Bendix Hand Control Valve applies the brakes in amount exactly corresponding to where the handle is set—no more and no less—and the driver can depend on it.

ACTS CONSISTENTLY

Graduated braking is always the same, in application and release each time the valve is used.

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES

HOLDS A SETTING

When the handle is left in a fixed position, there is no tendency for brakes to creep on or off—no "leakaway" when the valve is seated.

AND HERE'S WHY

This new hand control valve is a product of Bendix, greatest name in braking. Engineered and precision built, it delivers dependable performance under all operating conditions.

AUTOMOTIVE INDUSTRIES

AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

Structural Foils for Greater Strength

Increasing demands for structural materials having high strength-weight ratios have led to additional investigations of present-type sandwich structures. This article considers test results of thin foil core materials of great strength when formed to the shape of a crinkled sine wave. Turn to page 24.

Modern Production Facilities for All-Australian Car

Described and illustrated are the modern plant and equipment inaugurated in November 1948 by General Motors-Holden's, Ltd., which was estimated to volume-produce 80 Holden cars per day in Australia by March 1950. Page 27.

Lower Unit Fuel Consumption a National Need

Mr. Alex Taub, author of the recent series of four articles on "High Compression Without High Octane Fuel" here analyzes modifications in engine design which could result in savings in fuel consumption per vehicle unit. Because the future is foreshadowed by eventual short supply of oil if the current tremendous expansion rate in oil consumption continues, the article is of heightened interest. Page 30.

Chevrolet's Torque Converter

The five element multiple-phase torque converter for Chevrolet's Powerglide transmission is fabricated entirely from a variety of steel stampings. The process may be termed precision cold forming. Just how the process produces a precision of a high order usually associated with machined parts rather than with stampings is revealed in this newsworthy account beginning on page 38.

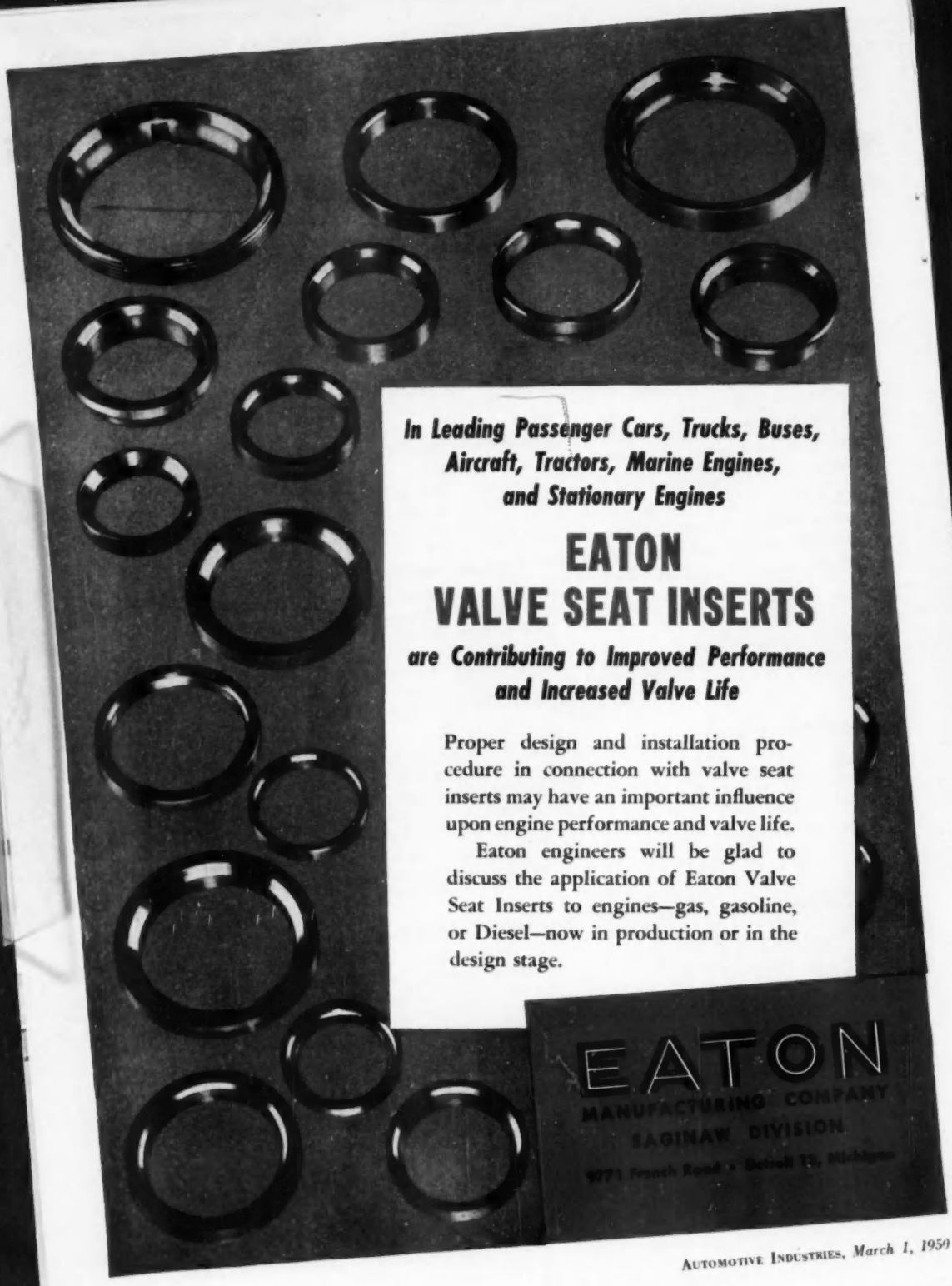
New Metal Forming Process

Freshly released by the Glenn L. Martin Co. are details of the Marform process. The process forms sheet metal parts by a simple punch for the male portion of the die and by rubber under controlled pressure for the female portion. The story starts on page 43.

24 New Product Items And Other High Spots, Such As:

The Continental aircooled Diesel engine; a steering gear that is combined with the front suspension; coupled axial flow turbine engines which drive contra-rotating propellers; and how rod caps are forged at Ford—ten to the bar.

News of the Automotive Industries, Page 13
For Complete Table of Contents, See Page 3


In Leading Passenger Cars, Trucks, Buses,
Aircraft, Tractors, Marine Engines,
and Stationary Engines
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VALVE SEAT INSERTS
are Contributing to Improved Performance
and Increased Valve Life
Proper design and installation procedure in connection with valve seat inserts may have an important influence upon engine performance and valve life.
Eaton engineers will be glad to discuss the application of Eaton Valve Seat Inserts to engines—gas, gasoline, or Diesel—now in production or in the design stage.
EATON
MANUFACTURING COMPANY
SAGINAW DIVISION

News of the AUTOMOTIVE INDUSTRIES

Vol. 102, No. 5 March 1, 1950

Million Vehicles Built So Far This Year

While it is now definite that the automobile industry will not reach its goal for the first three months of this year in car and truck production because of the Chrysler and coal strikes, the first two months were eminently satisfactory. Unofficial figures show that about one million vehicles were built in January and February of this year even though Chrysler was out since Jan. 25 and the coal strike curtailed overtime production at GM. Production for the two months was about 25 per cent ahead of last year, and would have been considerably more than that had not the work stoppages intervened. The outlook for March has been clouded by the coal strike. Steel production had been affected in February and delayed action effects of the coal strike were expected in March. Originally schedules for this month had been highest in history, but they certainly will not reach that point now. Nonetheless, when coal and steel are again in full supply, production lines will be running at top speed and by April should be hanging up a new monthly record.

Nash-Kelvinator Earnings Decline from Year Ago

As a result of the steel strike last fall, net earnings of the Nash-Kelvinator Corp. were lower than expected for the last quarter of 1949, totaling $4,215,849. The three months period is the first quarter of the 1950 Nash fiscal year. Earnings for the same period a year ago were $5,859,289. The steel strike closed Nash for about three weeks late last year resulting in production being curtailed by about one third below expectations.

To Show Over 100 Cars at British Show in NYC

The British Automobile and Motor Cycle Show, to be held in New York City, April 15-23, will display over 100 British automobiles. Trucks, buses, accessories and garage equipment, trailers, full lines of Diesel engines, motor cycles and bicycles from another two-dozen British firms will also be shown.

Budd to Build $7 Million Plant in Gary, Ind.

Costing about $7 million, including machinery, a new automobile body parts plant will be built by the Budd Co., in Gary, Ind. Called the Chase Plant, the 320,000 sq ft unit will be of modern design and located on a 140-acre site. The new location is close to two of Budd's leading customers: Studebaker in South Bend, Ind., and Nash in Kenosha, Wisc., and the proximity of Carnegie-Illinois and Inland Steel plants will also be an advantage. It is expected that the new facilities will be completed this summer, at which time the plant will go into immediate operation.

Tucker Dealers Propose Reorganization Plan

A group of Tucker dealers and distributors have filed a reorganization plan with trustees of the defunct Tucker Corp. Under the proposal, present dealers and stockholders would finance reorganization of the company through exchange of stock. The plan provides that $25 million in cumulative preferred stock be issued, with dealers to purchase an additional $12 million worth of debentures at the rate of $200 as each of 60,000 cars is delivered. Tucker Corp. is currently in Federal Court in Chicago for possible reorganization under bankruptcy laws.

ON OR OFF

Developed by the Four Wheel Drive Auto Co., Clintonville, Wisc., this light-duty, four-wheel-drive truck is now being introduced. Identified as Model LD, it has a GVW of 14,500 lb, while up to now, 17,000 lb GVW has marked the beginning of the FWD range, which extends up to 58,000 lb. The new Model LD can be used in off-the-highway service, and it also is reported to have high on the road efficiency.

All Makes of Cars Exhibited at Chicago Auto Show

The Chicago Automobile Show, held Feb. 18-26, was the nearest to a national automobile show since before the war. It was the first to include products of all passenger car builders and most motor trucks, commercial trailer and body manufacturers, and parts and accessories suppliers. Nineteen different makes of passenger cars were on display including the Kaiser low-priced automobile which is not scheduled to go into production until June.

Nash Promotes Romney to Vice President

George Romney, assistant to the president of the Nash-Kelvinator Corp., has been elected a vice president. Before joining Nash two years ago, he had been managing director of the Automobile Manufacturers Association.

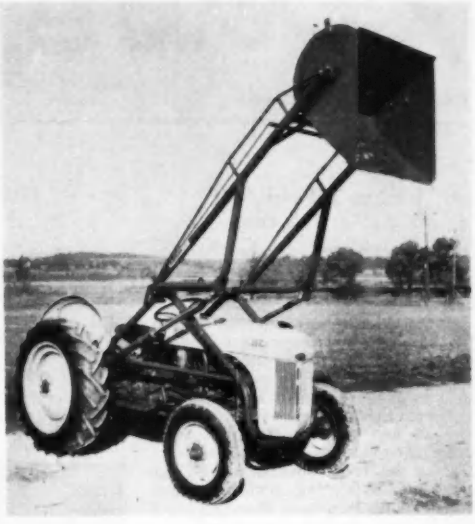
New Union Demands Complicate Chrysler Strike

The injection of more than 100 new contract demands by the union against the Chrysler Corp. has complicated the dispute, and will probably extend the duration of the strike beyond what it would have been had only the pension issue been at stake. Chrysler disputes the union's contention that the entire contract is open to negotiations as a result of the strike and maintains that all issues except those over which the strike was called are not open until next Aug. 1. Included by the union in its demands are a union shop, improved grievance procedure, broader jurisdiction of the impartial umpire, elimination of classification inequities, time and half for all Saturday work, increased vacation pay, and many others.

There is some thinking that the new demands might provide a means to resolve the pension dispute by making possible agreement in other areas which the union could label a certain cents-per-hour package and thus get off the hook so far as the pension impasse is concerned, however, both sides look for a long-drawn out conflict. The union has told its members to find work wherever possible, and it is understood that salaried personnel at Briggs, which supplies bodies to Chrysler, have been told to take their vacation and plan to be back by April 1.

FARMER'S FRIEND

The Dearborn Motors Corp. has added a series of three newly-designed material loaders to its line. The Dearborn Standard Loader, shown here, has a load capacity of 750 lb, and can be equipped with either a material bucket, manure fork, or crane. Fitting into many lifting and loading jobs about the farm, it is the basic unit. All three of these new Dearborn loaders can be easily attached to and detached from the Ford Tractor.



TEACHER'S HELPER

Bought by Venezuela's Ministry of Labor, this mobile schoolhouse, an International Harvester model KB-5-M Metro truck, has a 12-ft body on a 135-in. wheelbase. Included in its 360 cu ft interior are the most modern teaching aids—De Vry 16 mm sound movie projector, all-wave radio, two-speed turntable for records, three microphones and a public address system, and quarters for two men.

An interesting point in the Chrysler strike is that interpretation of the Ford contract clause dealing with a definite cents-per-hour commitment is a factor. Section Two of the Ford agreement is currently in dispute, and it will probably go to the umpire for interpretation. The union would like very much to get a definite commitment from Chrysler establishing a cents-per-hour principle to aid its case when it takes the Ford contract to the umpire for clarification. Another important principle being fought out by Chrysler is that of joint administration of the pension program. Chrysler clearly considers this an invasion of its management prerogative, and is making a determined fight to keep the union from getting its toe in the door and possibly opening the way for further encrochment in other matters which clearly have long been a union objective.

To Hold Pan-American Race in Mexico from May 5 to 9

Inaugurating 2178 mi of highways which will link Mexico's northern and southern borders, completing that nation's portion of the Pan-American Highway system, the Mexican Pan-American Race will start at Ciudad Juarez, on May 5 and will carry the competitors to El Ocotal on the Guatemalan border on May 9. The rules permit entry of any passenger automobile, without distinction as to make, model or year of manufacture, if it is of standard type, with closed body, with

five seats, with factory equipment, and without changes or special added equipment of any kind. Sport, coupe and convertible types are barred.

U. S. Rubber Head Sees 100,000-Mile Tire

A 100,000-mile tire and tailor-made raw rubber are some developments that may be seen in the not too far distant future, according to Harry E. Humphreys, Jr., president, U. S. Rubber Co. "The day will doubtless come when we'll have a 100,000-mile tire and different kinds of synthetic rubbers all designed for specific uses," Mr. Humphreys said on a recent visit to the West Coast.

Italian Car Output Hit Record in 1949

Italian automobile production in 1949 attained an all-time record with a total output of 86,054 vehicles, an increase of 43.5 per cent over the preceding year. These were composed of 65,379 passenger cars, 13,749 light delivery vehicles, 4953 trucks and 1973 buses or coaches. The increase was progessive. Each month's figures were higher than the previous month, with the exception of August. Exports rose 23.3 per cent to a total of 17,550, comprising 16,880 passenger cars and light delivery trucks and 670 heavy trucks, buses and coaches.

Name Haller President of NADA

Fred L. Haller of Washington, D. C., has been elected president of the National Automobile Dealers Association, at the organization's 34th annual convention in Atlantic City, N. J., succeeding George F. Ziesmer. R. D. McKay, Wichita, Kan., was named first vice president; Charles C. Freed, Salt Lake City, Utah, secretary; E. S. Dowd, Cleveland, treasurer; and Jay Green, Washington, D. C., assistant treasurer.

Start Hudson Assembly In Canada

Arrangements have been completed to produce new Hudsons in Canada, C. R. Gall, vice-president, Hudson Motors of Canada, Ltd., at Tilbury, Ont., Canada, has announced. The first Hudsons should reach dealers early this spring. Parts will be shipped in from Detroit and assembled at Tilbury. There will be no manufacturing operation, although some of the essential parts of the car will be manufactured by supplier firms in this and other areas in Canada.

Continental Motors Net Down from Year Ago

Continental Motors Corp. reports a sharp drop in earnings for the fiscal year ended last Oct. 31. Profits totaled $1,801,205, compared with $3,378,123 for the 1948 fiscal year. The report also revealed that 43 per cent of the company's production last year went to the agricultural industry, 14 per cent was for industrial use, 12 per cent went to the transportation industry, 21 per cent was accounted for by replacement parts and machine products, and the remaining 10 per cent was comprised of airplane, marine and military engines. The bulk of the $18 million order for tank engines for the Ordnance Dept. is to be completed this year, and negotiations are underway for production of a similar but smaller engine when the present contract is completed.

Ford Starts Delivery of White House Fleet

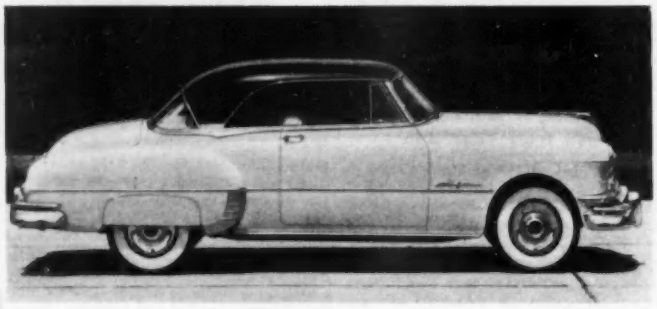
The Ford Motor Co. has delivered the first of a fleet of ten custom built Lincoln automobiles to the White House. The first vehicle is a seven-passenger limousine equipped with special running boards for secret service agents. Eight more limousines will be delivered later along with a seven-passenger convertible, also with running boards. The first car delivered is to be used by President Truman. The passenger compartment is separated from the driver's compartment by a glass partition. The car has a special wheelbase of 145-in. and special frame, chassis, and springs. Overall length is 20 ft and width is 7 ft, 5½ in., compared with a length of 18.44 ft and width of 6.58 ft for the regular Lincoln Cosmopolitan. Curb weight is 6163 lb, which is 1706 lb heavier than the standard model. It is powered by the regular high compression V-8 Lincoln engine of 152 hp, and equipped with a heavy duty Hydra-Matic transmission. The top is covered with pyroxalyn Landau grain coated fabric.

The President's car and three other limousines, which are being fitted for

MERCURY SET TON MILE MARK IN GRAND CANYON RUN

America's automobile industry was honored for its participation in the world's largest stock car event—the Mobilgas Grand Canyon Economy Run. Thirty-one stock sedans representing every make of American automobile manufacture, with the exception of Buick and Pontiac, competed in the classic event. Finishing the grueling drive in the maximum allowed time of 18.5 hr, the cars had a combined average of 22.074 mpg. In releasing the average, A. C. Pillsbury, regional director of the contest board of the American Automobile Association, told AUTOMOTIVE INDUSTRIES that the average mpg was surprisingly high because it was thought that the tremendous altitude variation on the 751-mile course, and the fast pace each car would have to travel would preclude such a mileage figure. Not only was the average mileage of each car high but the sweepstakes winner of the event, a Mercury, set a ton-mile mark of 61.2711. Its actual mpg average was 26.524. The Mercury sedan was closely pressed by a Cadillac 60 Special which finished the run with a ton-mile mark of 59.1179 and an actual record of 22.080 mpg, the second highest sweepstakes rating and to take first place in Price Division I. In Price Division A, a Willys Jeepster won a first place trophy when AAA officials reported that it had finished the run with a mpg mark of 26.099. Top honors in Price Division B went to Ford which averaged 23.326 mpg. Price Division C and D vied for honors in being the most hotly contested division in the event. In Price Division C, a Kaiser Special won the trophy, with a ton-mile average of 53.04 and an actual average of 23.946 mpg to capture the top award. Price Division D featured another group of cars that came in with a close finish. It was in this class that the Mercury sweepstakes winner was located. Studebaker Land Cruiser got first award in Price Division E. The car won with a 55.6855 ton-mile mark and an average of 24.887 mpg. In Class F the Frazer Manhattan earned its first place award with a ton-mile rating of 54.3303 and an average of 23.907 actual mpg. A Cadillac 61 made a ton-mile mark of 58.5212 and 22.972 mpg to get the first trophy awarded in Price Division G. In Price Division H a Cadillac 62 captured first place with 58.5651 ton miles per gallon and 22.525 actual mpg, which gave it third place in the sweepstakes.

A Cadillac 75 was first in Price Division J with a ton-mile rating of 51.0874 and a mpg mark of 17.245.



COMBINATION ADDED

Pontiac has added this Catalina model, combining the style of a convertible with the comfort and weather adaptability of a sedan, to its 1950 line. Two models, the super deluxe (shown above) and deluxe are available, differing in color choice and in interior treatment. Both Catalinas are available with six or eight cyl engines and Hydra-Matic transmission as optional equipment.

use by high dignitaries, are equipped with special gold plated appointments and fitted cases of brown alligator recessed in the sides of the compartment, including a thermos case, writing case with gold pen, cigar and cigarette case and arm rest cigarette case. A lap robe of finest broadcloth with a plush lining of harmonizing colors is furnished with each of the four cars. Upholstery in the President's car is a rich gray shadow stripe broadcloth with gray grained metal garnish moldings. Five of the limousines have chrome plated appointments. The fleet of cars is being leased to the government under contract under which the title remains with the Ford Motor Co. Bodies were constructed by Henney Motor Co., Inc., of Freeport, Ill., under direction of Lincoln-Mercury engineers. The body for the convertible is being built by Raymond H. Dietrich, Inc., body builders of Grand Rapids, Mich.

Schedule Metal Powder Show for Detroit April 25-26

The Metal Powder Association will hold its annual metal powder show in Detroit, April 25-26. The show this year is larger than formerly with more and larger exhibits. It has been moved from Chicago to Detroit because the automobile industry represents a large segment of the powder metallurgy industry.

E. F. Blair Elected Packard Director

Edwin F. Blair has been elected a director of the Packard Motor Car Co. A well known New York attorney, he fills the vacancy caused by the recent retirement of George T. Christopher who retired as president and director Dec. 31. He is a member of the law firm of Blair & Ogden, N. Y., and a director of the Union Bag & Paper Corp., Holly Sugar Corp., and T. A. D. Jones Co.

Industry Sales and Inventories Declined During 1949

Both sales and inventories of manufacturers declined during 1949, partly because of declining prices, but also because of somewhat lower physical production, the Office of Business Economics reports. Total manufacturers' sales were estimated at $213 billion, down six per cent below 1948. Only motor vehicle sales, up 15 per cent, and other transportation equipment including aircraft, up five per cent showed more than small increases. Manufacturing year-end inventories were estimated at about $31 billion, a decline in book value of slightly more than $3 billion. The heaviest decline was in durable goods.

GM Official Predicts No Price Cuts Now

GM is not contemplating any immediate price cuts on its automobiles, according to Hugh Dean, GM manufacturing vice-president. He points out that the steel price increase put into effect late last year amounted to about $12 a ton on the average, and that labor costs appear to be on the increase. GM has yet to settle on a pension program with its employes, which undoubtedly will increase labor costs.

Canadian Car Industry Hit Sales Record in 1949

Canada's automobile industry did a thriving business last year as Canadians bought more new motor vehicles, 275,537, than at any other time in history. The 275,537 new vehicles bought in 1949 were worth $569,907,258 compared with the previous high of 221,300 vehicles valued at $439,216,988 in 1948, the Canadian Bureau of Statistics reported.

EIGHT POWERS EIGHT

This new 1950 Mercury station wagon, for both pleasure driving and heavy-duty hauling, has an all-steel body with wood-on-steel side panels, and is powered by the 110-hp V-8 Mercury engine. There is room for eight passengers. With the two rear seats removed and tailgate down, the storage space on the deck measures over nine ft in length.

INDUSTRIES

Frank A. Seiberling Retires at 90

Frank A. Seiberling, who founded Goodyear Tire & Rubber Co in 1898, has resigned as chairman and director of Seiberling Rubber Co. which he also founded in 1921. He is 90 years old. He started Goodyear with $3,500 in borrowed capital in an abandoned strawboard factory in East Akron and saw it grow to become the largest rubber company in the world. When he lost control of the company in 1921, he and his brother, Charles W., started Seiberling Rubber Co. in which he was active up to about a year ago when his health failed. His successor as chairman has not yet been announced.

W. C. Ritchie Offers Free Packaging Evaluation

Marking its entrance into the manufacture of folding cartons, the W. C. Ritchie and Co., Chicago, is offering makers of packaged products a free evaluation of their present packaging and Dave Chapman, nationally known industrial designer, has been retained for this purpose. J. H. Crones, president, W. C. Ritchie and Co., says that this well known packaging designer will evaluate packages on such essential factors as eye appeal, product requirements, material suitability, economy and merchandising considerations, and other elements that enter into the development of a good package. The Ritchie company also makes an extensive line of set-up boxes, transparent containers, fibre cans, and tubes and spools

Government Starts to Draft "Packing" Rules

Federal regulation of automobile financing practices was a step closer this month, as government attorneys began drafting the final version of rules calculated to stop the "packing" of retail sales contracts. Considerable opposition to the proposed rules was raised at a public hearing before the Federal Trade Commission early in February, but FTC attorneys expressed the opinion that the rules "would go through" in spite of opposition. The FTC says that the purpose of the proposed rules is to stop what it calls "concealed packing and other related practices in the financing of motor vehicles to the end that such financing transactions may be maintained free from deceptive or unfair competitive methods."

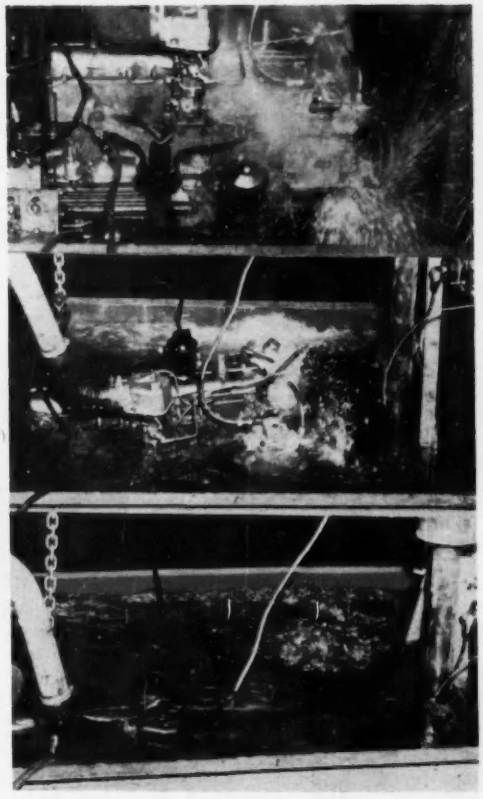
The proposed rules require that the buyer of an automobile be furnished with an itemization of his cost in the installment purchase of a car and for the delivering to the buyer of a copy of the installment sales contract. In addition, the new rules will prohibit any misrepresentations as to insurance rates and coverage, finance charges, endorsements or transfers of installment sales contracts, etc., and the use of multiple rate charts in connection with "packing" finance charges.

Numerous state insurance commissioners voiced their opposition to a proposed rule (Rule 4) declaring it illegal to misrepresent insurance rates. They pointed out that the regulation of insurance has been delegated to the states by Congress, and that any attempt by the Federal Government to control insurance would be without legal authority. Joseph P. McCarthy, speaking for the National Used Car Dealers' Association, told the commission that the proposed rules were an "encroachment," and said that free competition would take care of the situation and would in time eliminate any "snide" practices existing in the trade. "There is almost unanimous objection in the trade to these rules," Mr. McCarthy declared. "If policing is necessary," he stated, "leave it up to the states."

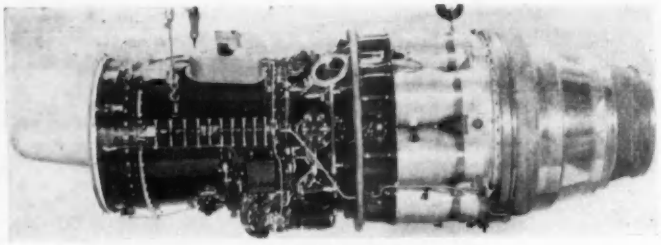
Frank Cain, counsel for the Texas Used Car Dealers' Association, said that if the rules were adopted, many finance companies would "go out of business," and charged that "the concept of discount paper would be destroyed."

Actual promulgation of the rules is still several months away. The FTC, meanwhile, is studying the pro-and-con views expressed by both sides.

WORKS UNDER WATER



These are three stages in an unusual water test conducted in Reo Motors Inc.'s plant. While running, the Reo Gold Comet gasoline engine was completely submerged in a six-ft tank of water, shut off while below the surface, and started again, several times. Air intake and exhaust pipes were the only parts above water level. Reo engineers report that the engine ran under water at speeds ranging from 1000 to 2000 rpm. The engine was equipped with aircraft-type, waterproof spark plugs, and waterproofed distributor, generator and starter.



LATEST IN JETS

Latest of the Rolls Royce jet engines is the Avon R.A. 2, used in Britain's first jet bomber, the Canberra and the A. V. Roe Canada Ltd. prototype CF 100. The Avon R.A. 2, which has an axial compressor and eight combustion chambers, is stated to have a rating of 6000 lb thrust at sea level and to weigh 2400 lb.

General Motors to Build Plane of Tomorrow

For the second time GM is moving out of the automobile field to pioneer development in another field of transportation. The first time it was the Train of Tomorrow. Now GM is moving into aviation to build a Plane of Tomorrow. GM's Allison Div. has bought a Convair liner from Consolidated Vultee and will install two gas turbine propeller engines to make it the first commercial air liner equipped with jet turboprop engines (see cut on this page). The T-38 engine was developed for the Navy's XPBY-5 flying boat and develops 2750 hp. The plane will be tested first as a cargo carrier and will be used as a demonstrator for other aircraft manufacturers, the military services, and commercial airline operators.

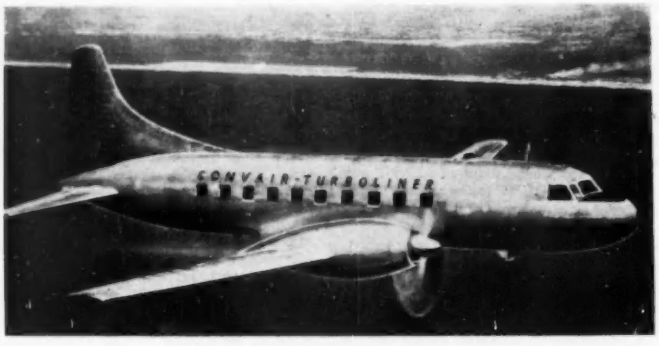
Test Plastic Water Pump Impellers

Two automobile companies are doing development work with plastic impellers for water pumps, such as are used in the 1950 Cadillac. Both report, however, that they still have some problems to solve before they can adopt plastic units to their particular requirements.

Ford Completes First Unit of Research Center

Ford has completed and has in operation the first unit of its projected research and engineering center at Dearborn. The first unit is one wing of the engine development laboratory containing 16 sound-proofed test rooms. Fifteen of the rooms are equipped with 200 hp-GE amplidyne direct current dynamometers for engine testing, and one cell is equipped with a 250 hp dynamometer and a 600-hp induction type dynamometer for testing transmissions and torque converters. Current developed when engines are under test is run back into the power circuits. Construction is the very last word in design, and embodies many unusual features. The company spent more than $100,000 developing the first pilot test room. Wall construction consists of concrete cinder blocks lined with a perforated acoustical metal with an air space between. On the corridor side double glass windows are installed with safety glass used for the inner section and plate glass for the outer pane. The two sections of glass are separated by several inches of space so that in the event of an explosion the inner section will take most of the force. Elaborate precautions are taken for fire protection with automatic flooding with CO_2 provided through means of thermocouple control.

In addition, an exterior control is provided so that by merely pushing a button all air and fuel is shut off within the cell and the CO_2 is released. Ventilation is unique in that fresh air is forced downward through the room and is exhausted through a grating at each end of the dynamometer, carrying with it engine heat, fumes, and heavier gases. Operators within the rooms are provided with safety controls including a button which the operator can press to stop all activity, and a safety door equipped with a "panic bar" latch release for quick escape from the room. Bids are now out for the second wing of the engine test laboratory, and work will probably be started on it this spring. The engineering center is located on a 500-acre site and when completed will consist of a cross-shaped structure 450 by 430 ft. When originally announced, cost was estimated at about $50 million, but because of increased building costs since that time and also due to some change of plans, the cost will undoubtedly be much higher, possibly close to $100 million.



FIRST APPEARANCE

The Consolidated Vultee Aircraft Corp. says that this is what America's first turboprop transport will look like. A Convair-Liner, ordered by GM's Allison Div. from Convair, is now being equipped with Allison T-38 turboprop engines. The Convair-Turboliner, scheduled for completion this summer at Convair's San Diego plant, will be a cargo version. Allison will use it in a flight test research program and for demonstration.

Engine Oil Recommended for Studebaker Drive

An interesting note in connection with the Studebaker torque converter to be offered on the company's cars soon is that service directions do not call for a special transmission fluid as is the case with other companies. Studebaker is recommending use of 10-W premium type engine oil or SAE 10-10W premium

type. This is in direct contrast to recommendations made by GM for its Hydra-Matic, Dynaflow and Powerglide transmissions which call for special lubricant designated as type A. GM has insisted that owners do not use engine oil, stating that it may cause varnishing and gumming of the delicate valving mechanisms. Studebaker, however, apparently believes that the premium type oil will give no trouble. It is also of interest that Packard is recommending use of engine oil in its reverse gear for marine engines.

Private Group in Texas Plan Toll Highway

Five Texas businessmen have formed a corporation to build a private toll highway between Dallas and Houston. It is by far the largest private endeavor in road building ever to be attempted by a non-government organization. The cost has been estimated at close to $100 million for the road which would be in the neighborhood of 220 mi long.

Ford Moving Operations from Monroe Plant

Ford has confirmed that it will move the operations from its Hamilton, O. plant to its new and much larger plant at Monroe, Mich. The move will be started next month and will be completed by next September. Transfer of operations to the Monroe plant is dictated by increases in production which cannot be accommodated by the limited space at the Hamilton plant, where facilities cannot be enlarged to handle wheel, coil spring and running board production. All employes except newer ones will be given the opportunity to transfer to the Monroe plant with no loss of credit for years of service as it applies to pension, vacation and holiday pay.

GM Expanding Output of Hydra-Matic

GM's Detroit Transmission Div. has started construction of a second unit adjacent to the recently completed plant just west of Detroit. When the new building is completed, floor space in both plants will include more than 470,000 sq ft. Machining operations in the new section will begin in July of this year. The new plant is being added to take care of expanded production capacity required to meet demands for Hydra-Matic transmissions for the GM car divisions and for Lincoln, Nash and Kaiser-Frazer.

Morcom Heads Ford Traffic Department

Thomas J. Morcom has been appointed manager of the newly formed traffic department of the Ford Div. of Ford Motor Co. He was formerly head of the pool car coordination section of the general traffic department.

Reo Announces New 1950 Line

Reo Motors, Inc., recently announced its new line of 1950 truck models including models E-19, E-22, and E-23 in the medium and heavy-duty field. It will be recalled that when the model E-22 was announced in July, 1949, (AUTOMOTIVE INDUSTRIES, July 1, 1949) it featured appearance changes, design changes, and improved accessibility, particularly with respect to the hood which swings up from the bumper line to expose the entire engine for servicing. The styling characteristics and other features of the E-22 model have now been incorporated in the other basic models of the line. The line now includes 11 basic models, five tandem units, and seven different power plants. In addition to the truck models, Reo also offers a new Gold Comet school bus, and Reo Flying Cloud transit coach.

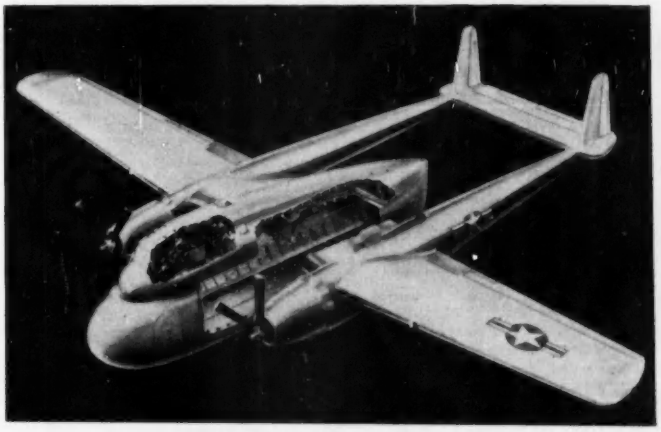
An interesting feature of the Reo announcement comes in the release of the second model in the wet-sleeve Gold Comet gasoline engine series, supplementing the first model 331 cu in. displacement engine, which appeared in July, 1949. The new model (see specifications data) has a displacement of 292 cu in. and is identical in mechanical design to the larger model. It will power the E-21 series trucks and is said to have sufficient net horsepower to move a 34,500 lb tractor-trailer combination at 55 mph. The basic mechanical specifications of the three lines of trucks mentioned here remain unchanged.

Condensed Mechanical Specifications
Reo Gold Crown Comet Engine (six-cyl)

Bore (in.)	3⅞
Stroke (in.)	4½
Displacement (cu in.)	292
Compression ratio	6.55 to 1
Governed gross bhp	124 @ 3300 rpm
Governed net bhp	110 @ 3300 rpm
Maximum gross torque (lb ft)	224 @ 1400 rpm
Maximum Net Torque (lb ft)	218 @ 1400 rpm
Number Main Bearings	7

Ford Consolidating Parts and Accessories Units

Ford is planning to build a new central office and parts warehouse just west of Detroit as a move in consolidating its parts and accessories activities which are currently located at the Rouge and Highland Park plants. The Ford regional and district sales offices will also be moved from downtown Detroit to the new location. Construction is expected to get underway shortly on the 720 by 1230 ft building which will have 885,600 sq ft of floor space. The most modern parts handling equipment, including conveyor lines, will be installed.



PICKS UP AND DELIVERS

Now being readied for its first flight at the Fairchild Aircraft Div., Hagerstown, Md., the Fairchild "Pack Plane," designated the XC-120, features a detachable fuselage or "pod". It can deposit its cargo-or-passenger compartment at an airport and fly off again to pick up another already-loaded fuselage.

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the Twelve Months' Totals

MAKE	December 1949	November 1949	December 1948	TWELVE MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	27,167	27,497	23,802	345,519	302,219	35.93	29.19
Ford	21,609	20,857	12,371	202,179	226,729	21.02	21.81
Dodge	8,905	9,509	8,419	116,956	114,431	12.16	11.05
International	6,205	6,832	6,945	91,164	125,203	9.48	12.09
G. M. C.	5,411	6,020	5,896	80,407	74,857	8.36	7.23
Studebaker	4,055	4,044	4,287	55,099	50,657	5.73	4.89
Willys-Truck	998	1,041	2,467	18,293	27,840	1.90	2.69
Willys-Jeep	1,064	915	2,401	14,472	48,644	1.50	4.70
White	820	585	864	8,318	11,603	.86	1.12
Mack	719	619	590	6,866	9,795	.71	.95
Diamond T	389	359	574	5,172	10,657	.54	1.03
Reo	271	281	620	4,003	10,773	.41	1.04
Divco	238	233	251	3,577	5,616	.37	.54
Autocar	162	120	210	1,655	2,770	.17	.27
Brockway	176	151	177	1,626	2,958	.17	.29
Federal	130	89	115	1,225	4,026	.13	.39
Crosley	51	44	100	871	2,411	.09	.23
Pontiac	193	148		775		.08	
Kenworth	23	43	56	392	478	.04	.05
F. W. D.	26	25	23	337	811	.04	.08
Sterling	14	22	24	229	411	.02	.04
All Others	196	175	277	2,826	3,283	.29	.32
Total	78,805	79,099	70,282	961,961	1,035,174	100.00	100.00

* Based on data from R. L. Polk & Co.

Ford's New Plant in Buffalo to Start Operating in August

Hiring of production workers for the Ford Motor Co.'s new $35 million pressed steel plant in Buffalo, N. Y., is scheduled to begin in August when actual production in the big factory is expected to get underway. This was disclosed by Alton J. Hole who was recently named manager of the plant. He said that the hiring of skilled workers, such as tool and die makers and electricians, will start before August. Some trial production runs will also be made before then. About 40 per cent of the structural steel work on the plant has been completed. Stampings to be turned out here will be shipped to all Ford assembly plants, according to Mr. Hole.

U. S. Rubber Develops New Safety Tube

The U. S. Rubber Co. has announced a new type safety inner tube constructed with two plys of nylon cord. Because its construction is similar to that used in automobile tires, the tube will actually support the weight of the automobile without the use of an outer casing. In the case of a puncture the tube squeezes around the puncturing object preventing sudden flats and permitting only a slow leakage. Selling price is about three to four times that of the conventional tube.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the Twelve Months' Totals

MAKE	December 1949	November 1949	December 1948	TWELVE MONTHS Units 1949	Units 1948	Per Cent of Total 1949	Per Cent of Total 1948
Chevrolet	74,107	90,677	99,153	1,031,466	709,609	21.32	20.33
Ford	88,044	88,272	57,647	806,798	488,688	16.67	13.95
Plymouth	49,757	47,466	33,242	527,915	347,174	10.91	9.94
Buick	27,465	27,605	21,092	372,425	244,762	7.70	7.01
Pontiac	27,265	27,171	19,622	321,033	226,939	6.63	6.56
Dodge	23,367	27,509	21,213	273,530	213,923	5.65	6.13
Oldsmobile	22,369	23,159	9,352	269,351	175,531	5.57	5.03
Studebaker	17,068	17,894	11,219	199,460	143,129	4.12	4.10
Mercury	26,991	17,317	11,987	186,629	137,512	3.86	3.94
Hudson	12,338	7,059	11,581	137,907	109,497	2.85	3.14
Nash	9,806	11,781	7,543	135,328	104,156	2.80	2.98
Chrysler	10,786	11,515	9,787	130,516	105,315	2.70	3.02
De Soto	8,192	9,487	7,848	103,311	82,454	2.14	2.36
Packard	6,700	6,931	7,627	97,771	77,843	2.02	2.23
Cadillac	6,508	6,378	5,081	80,880	59,379	1.67	1.70
Kaiser	3,316	2,788	5,145	57,995	108,367	1.20	3.10
Lincoln	2,687	2,538	4,328	37,691	32,538	.78	.93
Willys	1,892	1,992	1,964	29,576	21,408	.59	.61
Frazer	522	463	3,432	15,827	57,994	.33	1.66
Crosley	545	615	1,074	10,175	25,400	.21	.73
British Ford	109	93	504	5,087	3,223	.10	.09
Austin	443	462	296	3,642	8,610	.08	.25
All Others	324	334	572	5,061	7,219	.10	.21
Total	414,579	409,702	311,419	4,838,342	3,490,952	100.00	100.00

* Based on data from R. L. Polk & Co.

Two Companies Studying Speedometer Projector

At least two automobile companies are interested in a new device which projects speedometer readings on the windshield. The device is said to promote safety because the driver can determine speed without scanning the instrument panel. One of the companies is working with the inventor of the device to project the entire instrument panel in a small spot on the windshield. There is some possibility that one or both companies may include the development in 1951 models.

Ford Increases Output at Canton Forge Plant

Ford has added three items to its manufacturing schedules at the Canton, O., forge plant. Additions of spindle supports and steering arms for Mercury, and transmission sliding gears for the Ford tractor has increased the production total by nearly 60,000 lb daily. Truck ring gears for service will be added soon adding another 36,000 lb to the daily total which currently is about a million pounds of forgings a day.

Changes in Design of Murphy Diesels

Some interesting changes in design detail have been made recently by the Murphy Diesel Co., Milwaukee, Wisc., in its Diesel engines. Perhaps the most interesting of these is a change in the design of the fuel injectors which are now operated positively by means of a rocker arm. In addition, the rigidity of the engine has been increased considerably by the introduction of a new crankshaft having four-in. diameter journals. The design of the connecting rod was also changed to suit the larger journal. The parting line between rod and bearing cap is now cut diagonally and the parting surfaces provided with heavy section milled serrations to assure positive alignment as well as secure fastening. The diagonal parting line also makes service operations easier to handle.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Packard Motor Car Co.—**Edwin F. Blair** has been elected a Director. He fills the vacancy caused by the retirement of **George T. Christopher.**

Ford Motor Co.—**J. B. Glass** has been appointed Asst. Business Management Manager of the Ford Div. Sales Dept. **Alex Lobbestael** has been made Acting Manager of the company's Parts and Equipment Mfg. Div. plant at Ypsilanti. **Thomas J. Morcom** has been made Manager of the newly formed Traffic Dept. of the Ford Div.

Ford International—The appointment of **C. E. Dalton** as Director of Sales, has been announced. **M. R. Dull** has been appointed manager of the Overseas Distributors Branch and **Harold E. Jones** is Manager of Export Operations.

Willys-Overland Motors, Inc.—The promotion of **F. F. Baldwin** to the managership of the fleet and equipment sales department has been announced. **Donald T. Ellis** has been made assistant manager of the department.

Willys-Overland Motors, Inc.—**Lyman W. Slack** has been made Vice-President in charge of distribution.

General Motors Corp., Chevrolet Motor Div.—The appointment of **T. T. Brown** as Asst. Manager of the commercial and truck department has been announced.

AiResearch Manufacturing Co.—**Burnham Adams** has joined the company as Sales Manager. **Roy Leckey,** formerly Sales Manager, is now in Washington for the company and **W. J. Pattison,** formerly Washington Representative, has been made Asst. to the President, with headquarters in Los Angeles.

Westinghouse Electric Corp.—**F. H. Clark** has been named Sales Manager for the Standard Control Div. with headquarters at Beaver, Pa.

New Departure Div., General Motors Corp.—The retirement of **Leroy A. Hillman** and **Harold G. Wilson,** of the sales staff, has been announced.

Norton Co.—**John C. Ewer** has been appointed Assistant General Manager of the Norton Grinding Wheel Co., Ltd., England.

General Electric Co.—**Dr. John H. Lux** has been appointed manager of the New Product Development Laboratory of the company's Chemical Dept.

The General Tire & Rubber Co.—**Tracy S. Clark** has been named Treasurer.

Harnischfeger Corp.—The appointment of **Melvin O. Monsler** as Sales Manager of the P & H Welding Div., has been announced.

The Torrington Co.—**E. K. Brown,** formerly Chief Engineer of the Needle Bearings Div., has been appointed Director of Research for the company.

Union Carbide and Carbon Corp.—**J. M. Spangler,** formerly Director, Vice-President and General Manager of the National Carbon Div., has been appointed President of the Div.

Hyster Co.—**Hollis I. Conner** has been appointed Asst. Manager of the Export Division.

Borg-Warner Corp.—Appointment of **D. M. Berges** as Chief Engineer, **Pesco Products Div.,** has been announced by **R. J. Minshall,** President of the Div.

Kennametal, Inc.—**C. J. Marlett** has been transferred to the engineering department as Project Engineer.

Koppers Co., Inc.—Establishment of an International Sales Section has been announced. **Fred C. Foy** is Vice-President and Manager of the department; **S. C. Whitehouse** has been appointed International Sales Manager.

The Glenn L. Martin Co.—**Jess W. Sweetser** has been named Asst. to the President, in charge of sales and contract administration.

Mack Trucks, Inc.—**J. V. Doll** has joined the company as Vice-President, Fleet Sales, and as special assistant to **H. W. Dodge,** Executive Vice-President.

Federated Metals Div., American Smelting & Refining Co.—Announce-

(*Turn to page 63, please*)

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

A.S.T.M. Electrical Heating, Resistance, and Related Alloys Mtg., Phila. ..... Mar. 1-2
Amer. Road Builder's Assoc., Cincinnati ..... Mar. 6-9
SAE-ASTM Technical Committee, Automotive Rubber Mtg., Detroit ..... Mar. 8
SAE Passenger Car, Body & Production Mtg., Detroit ..... Mar. 14-16
Geneva Motor Show, Geneva, Switzerland ..... Mar. 16-26
Southwest Automotive Show, San Antonio, Texas ..... Mar. 23-26
A.S.T.M. Stress Analysis in Action Mtg., St. Louis ..... Mar. 28
Nat'l Production Expos., Chicago.. Apr. 4-8
Amer. Inst. Elec. Engrs. Conf. on Elec. Welding, Detroit ..... Apr. 5-7
Midwest Power Conference, Chicago ..... Apr. 5-7
Amer. Society Lubrication Engineers Convention, Detroit ..... Apr. 10-11-12
Amer. Soc. Tool Engineers Industrial Expos., Phila. ..... Apr. 10-14
Society of Motor Mfrs. & Traders British Auto. & Motorcycle Show, New York City ..... Apr. 15-23
SAE Aeronautic & Aircraft Eng. Display, New York City ..... Apr. 17-19
Nat'l Packaging Exposition, Chicago ..... Apr. 24-27
Metal Powder Assoc. Annual Metal Powder Show, Detroit ..... Apr. 25-26
3rd Highway Transportation Congress, Washington ..... Apr. 25-27
International Motor Show, Turin, Italy ..... May 4-14
Mid West Automotive Show, Chicago ..... May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis. May 18-19
International Trade Fair, Toronto ..... May 29-June 9
Amer. Society for Quality Control, Fifth Midwest Conference-Annual Convention, Milwaukee, Wis. ..June 1-2
SAE Summer Mtg., French Lick ..June 4-9
Amer. Electroplaters' Soc. Convention, Boston ..... June 12-16
A.S.T.M. Annual Mtg., Atlantic City ..... June 26-30
International Trade Fair, Chicago. Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles ..... Aug. 14-16
SAE Tractor Mtg., Milwaukee..... Sept. 11
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo ..... Sept. 18-22
SAE Nat'l Transportation Mtg., New York City ..... Oct. 16-18
Amer. Society for Metals' Annual Nat'l Metal Congress & Exhibition, Chicago ..... Oct. 23-27

Necrology

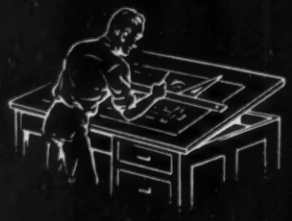
W. F. Wilkerson, 60, president, the Wyoming Automotive Co., Casper, Wyoming, and a past-president of the Motor and Equipment Wholesalers Association died on Feb. 5.

Harry C. Bigler, 47, manager, Detroit personnel activities for General Motors Corp., died in Ames, Iowa, on Feb. 13.

Theodore Schneider, pioneer French automobile manufacturer, founder of the Rochet-Schneider Automobile Co., of Lyons, and of the Th. Schneider Co., of Besancon, died in Paris, France, on Feb. 4.

Howard R. Crawford, 62, vice president, assistant secretary and assistant treasurer of National Automotive Fibres, Inc., Detroit, and also a vice president and a director of Canadian Automotive Trim, Ltd., Windsor, Ont., the Canadian subsidiary of National, died recently.

Lynn McNaughton, 68, former vice president in charge of sales and a director of the old Cadillac Motor Co., died in Detroit on Feb. 8.



FOR ENGINEERS,

DESIGNERS

basic

THE INVOLUTE CURVE
AND
INVOLUTE GEARING

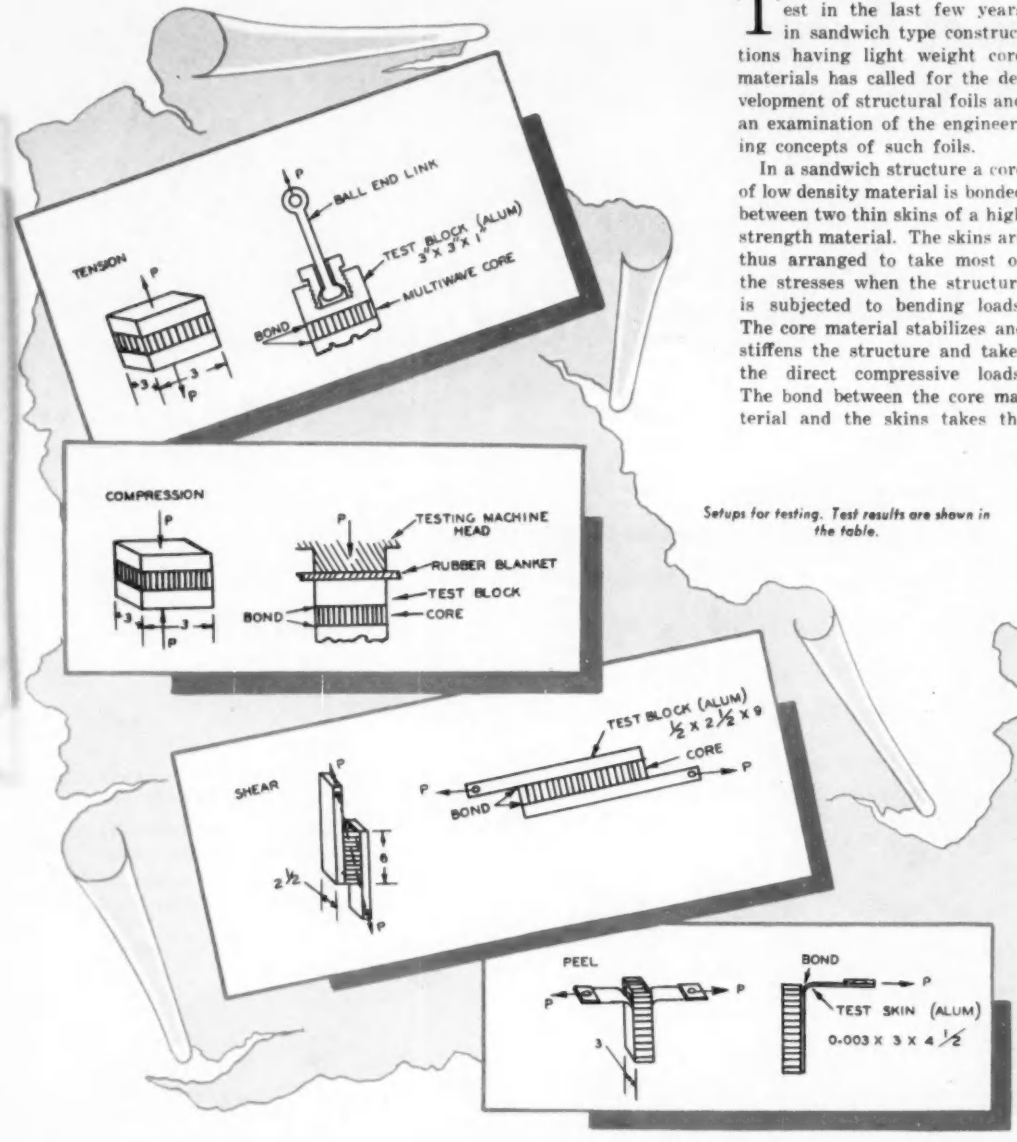
THE FELLOWS GEAR SHAPER CO.
SPRINGFIELD, VERMONT, U.S.A.

By R. E. Higgins,
Chief Engineer,
and G. G. Havens,
Research and Development,
Narmco, Inc.

Structural
for Greater

THE large amount of interest in the last few years in sandwich type constructions having light weight core materials has called for the development of structural foils and an examination of the engineering concepts of such foils.

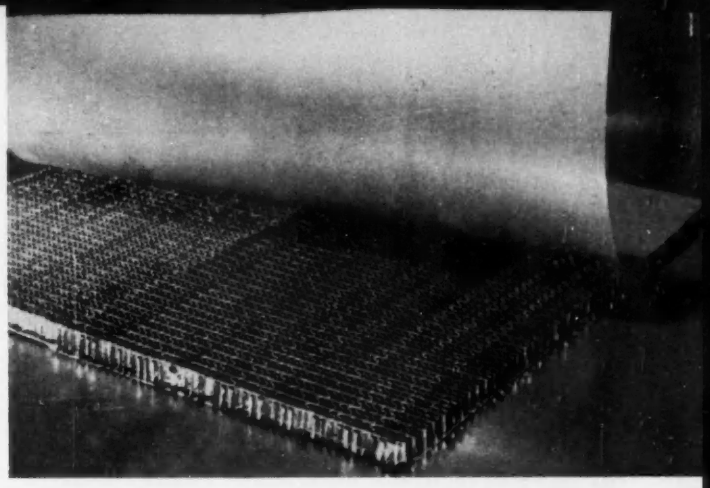
In a sandwich structure a core of low density material is bonded between two thin skins of a high strength material. The skins are thus arranged to take most of the stresses when the structure is subjected to bending loads. The core material stabilizes and stiffens the structure and takes the direct compressive loads. The bond between the core material and the skins takes the



Setups for testing. Test results are shown in the table.

Foils

Strength



tension loads.

Sandwich structures are the answers to the problems confronting designers in many fields because of the inherent characteristics of this type of construction; great strength and rigidity with very light weight. These advantages are being utilized extensively by the aircraft industry, and are being seriously examined by manufacturers of boats, automobiles, trucks and trailers, and housing.

In a typical sandwich panel, skins may be made of a number of materials such as thin plywood, steel, aluminum, magnesium or impregnated fiberglas laminates. Typical cores include cellulose foams, end-grain balsa wood, foamed rubber, and honeycombs of paper, cloth and aluminum.

Increasing demands for structural materials having high strength-weight ratios have led to additional investigation of present type sandwich structures. Such investigations are currently being based on the structural properties of thin foils. The use of these thin foils made it mandatory that consideration be given to three slenderness ratios, and has resulted in the development of Multiwave by Narmco, Inc. of San Diego, Calif.

Multiwave includes cores that are made of aluminum, glass cloth, paper or any other material that is formed in a prescribed manner. The core is characterized by the configuration of the core material into the crinkled sine wave. This configuration enables the core material to develop its great compressive strength because of the ratios of its several dimensions. These ratios are defined in simplified terms as:

(1) The ratio of the thickness of the sandwich to the amplitude of the sine wave form.

(2) The ratio of the amplitude of the sine wave form to the amplitude of the crinkle wave form.

(3) The ratio of the amplitude of the crinkle wave form to the thickness of the aluminum foil or material that is used for the core.

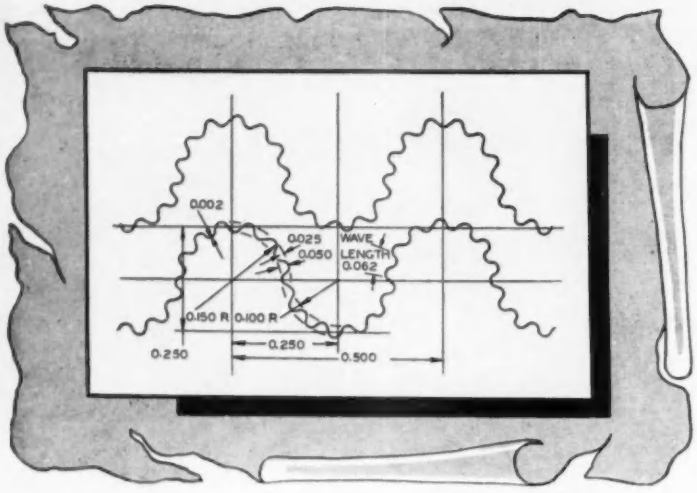
Narmco has assumed that the strongest structure is obtained when the three slenderness ratios are nearly equal to each other. As an example, to obtain three slenderness

Multiwave Test Results

(0.625 x 0.002 in. 24S Aluminum Core with Density 3.5 lb/cu ft)

Condition	Sample Size (in.)	Wave Direction	Failure Load (lb)	Failure psi	Type of Failure
Tension					
1	3 x 3	.....	3780	420	Tension Failure in Core
2	3 x 3	.....	3465	385	
Compression					
1	3 x 3	.....	7480	831	Buckling of Core
2	3 x 3	.....	7425	825	
Shear					
1	2.5 x 6	Parallel	2970	186	Shear in Core
2	2 x 6	Across	1940	161	
Peel					
1	3 x 3	Parallel	24	.....	Bond Failure
2	3 x 3	Parallel	37	.....	
3	3 x 3	Across	18-26	.....	
4	3 x 3	Across	18-26	.....	

Structural Foils



Multiwave core dimensions. (Retainer omitted)

ratios, foil 0.002 in. in thickness is crinkled to form a sine wave having an amplitude of approximately 0.020 in. This crinkled foil is then formed into a second sine wave having amplitude of approximately 0.2 in. thick. These crinkled sine wave elements are held together by a crinkled ribbon, sometimes called a "retainer" and sometimes referred to as a "stabilizer." It has been found that such a formation will support high loads where the distance between supports is two in. or more. It is not necessary that the crinkled foil be used as a sine wave; it can be formed into crinkled tubes or many other configurations. However, it appears at this time that the crinkled sine wave is the most easily adapted to practical problems, and most of the investigations have been made on this type construction.

Although Multiwave was developed to obtain high compression strengths from thin foils, a number of other desirable properties became apparent. Among these were: (1) The core can be formed into compound shapes having surprisingly small radii of curvature; (2) the core material does not contain closed cells; therefore, passage of heat is allowed through the core; (3) the crinkle aids in the formation of a fillet which increases peel resistance of the skin from the core.

Besides the above, other advantages can be obtained by modifications of the core material. For example, it is possible to increase the bonding area by putting "feet" on the surface of the core material. It is also possible to increase the width of the retainer so that hot air or gas is forced to flow in contact with only one skin while insulated from the other skin. These modifications of the core, of course, will depend upon the application involved.

Multiwave type core material can be made continuously. The cutting of the foil, dipping in the resin tank, the crinkling, the formation of the sine wave, the bonding, all are done in one machine and no manual labor is required from the time the rolls of foil, as purchased, are put into the machine until the time the core material is cut to the desired lengths. Widths of the core material are limited by the size of the machine; for wide sandwiches the strips of core material are placed side by side and bonded to the skin, much

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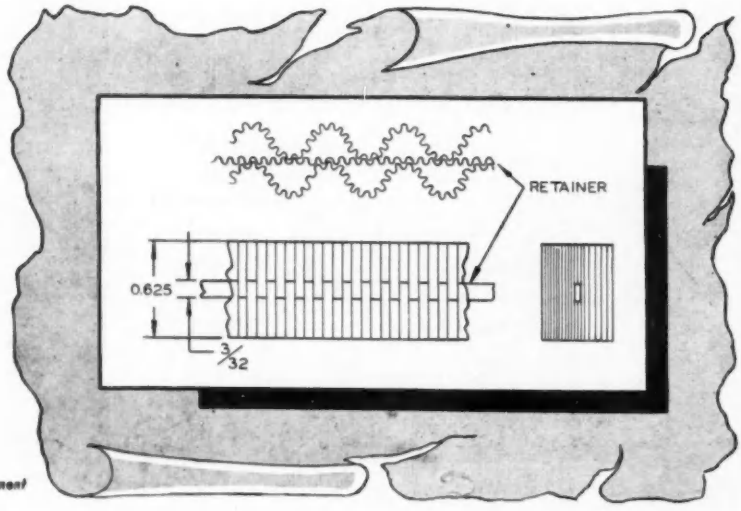
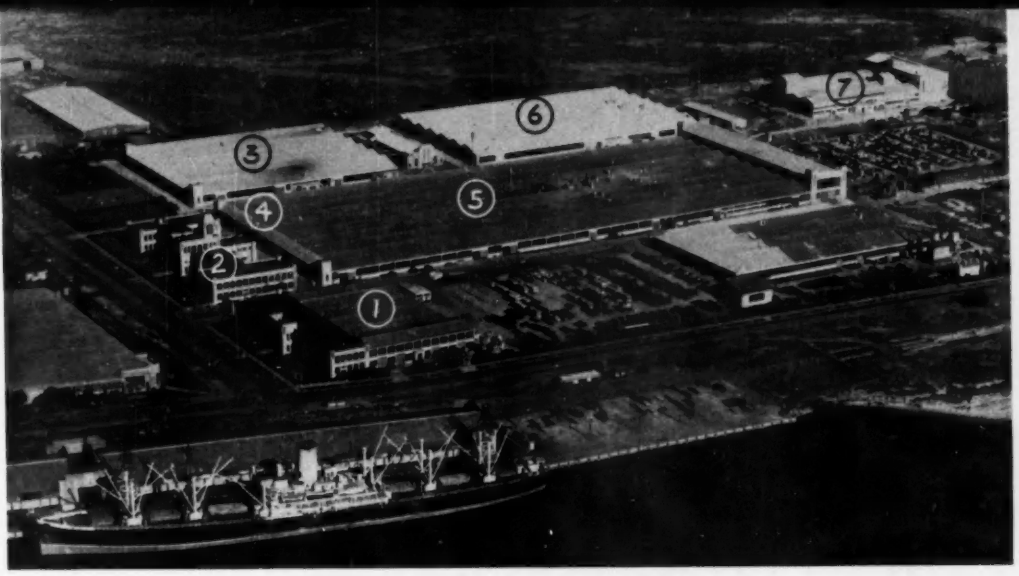


This illustration shows arrangement of retainer in core.



This aerial view of the new General Motors-Holden's Ltd. plant at Fishermen's Bend, Melbourne, Australia, shows the various buildings where all of the Holden mechanical components are manufactured. Numbered buildings are as follows: (1) Nasco, parts and accessories division; (2) central offices; (3) engineering; (4) laboratory; (5) assembly; (6) machining, finishing, inspection and testing; (7) foundry.

Modern Production Facilities For All-Australian Car

PRODUCTION of the first all-Australian volume-produced car, the Holden, was begun by General Motors-Holden's Ltd. in November, 1948. In order to start manufacture of the automobile, described in AUTOMOTIVE INDUSTRIES, Dec. 1, 1948, there was an expenditure of millions of dollars for the erection of two new plants, equipping them with latest-type machinery, and engaging and training employees.

The engine, and all main mechanical components of the Holden, are made in the new 50-acre plant at Fishermen's Bend, Melbourne, Victoria. An all-mechanized foundry produces the alloy grey-iron castings required for the manufacture of the Holden; and another new building contains equipment for the machining, finishing, precision inspection of all components, and the final assembly and testing of engines. It also houses the engineering and styling departments; and the most fully equipped chemical and metallurgical laboratory in Australian industry is located in

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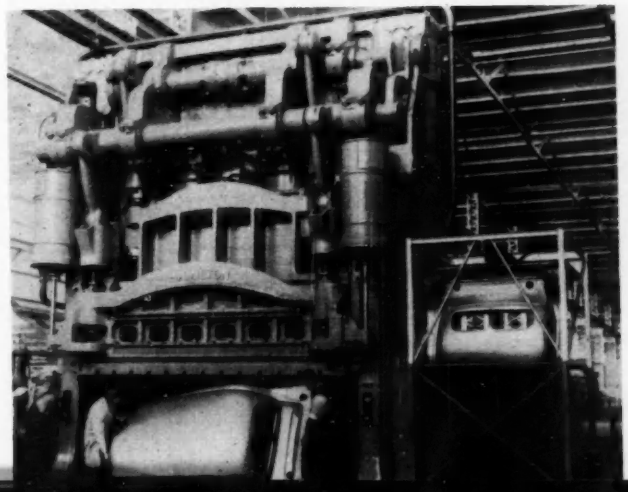
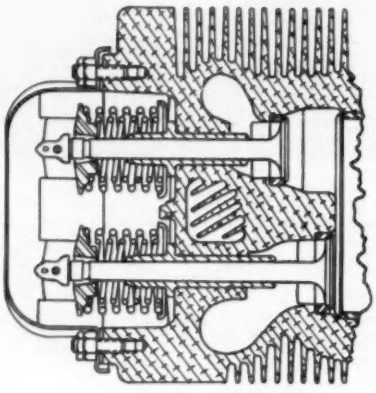


This giant Hamilton press used for stamping out roof panels is part of the equipment of the main press lines in the new GMH Woodville plant. Although many machines and machine parts were imported from the U. S., the Holden car represents only 10 per cent of the list price or five per cent by weight of imported components.

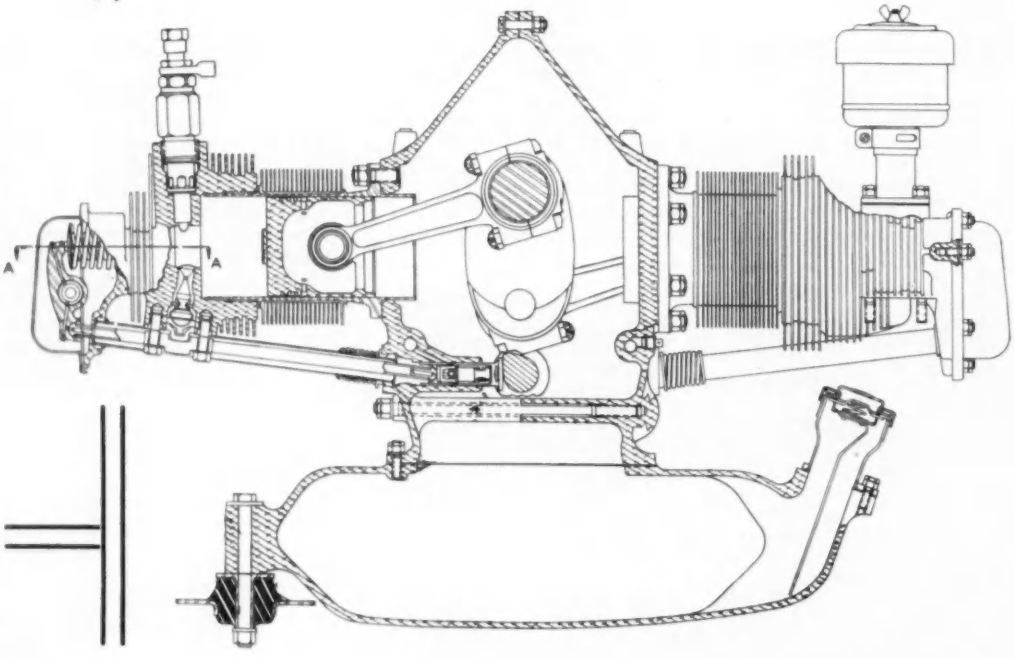
Continental Aircooled



SECTION A–A

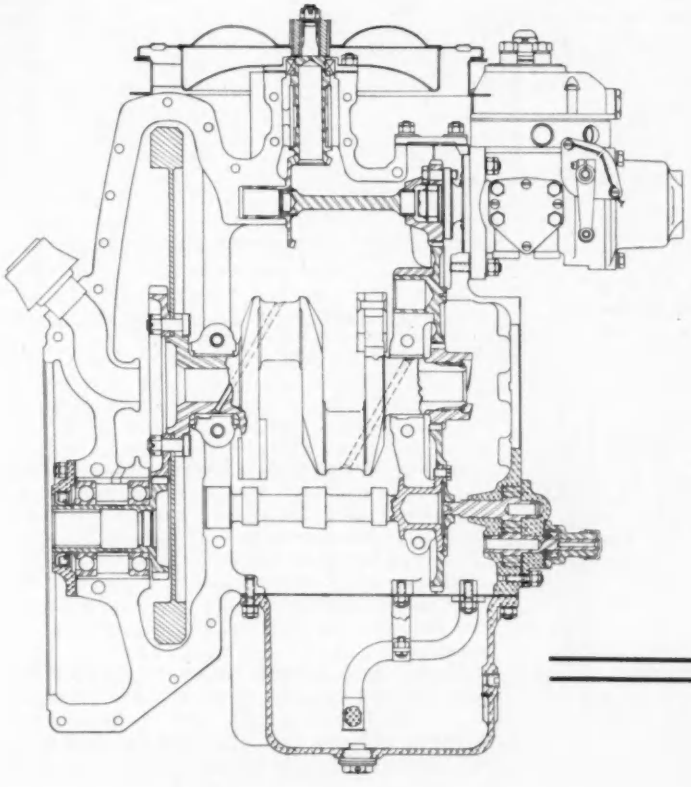
Longitudinal section of the two cyl engine. It is equipped with an American Bosch single-plunger fuel pump, driven at crankshaft speed, which incorporates as a unit assembly the supply pump and governor.

(On opposite page) Cross section of the 9.75 hp opposed two cyl engine. Bore is 3¼ in., stroke 3⅜ in., and displacement 60.14 cu in. The engine is naturally aspirated and employs the Lanova combustion principle used in larger Continental Diesel engines. Section "A" — "A" (left) shows arrangement of the overhead valves.



Diesel *Engine*

The two new aircooled Diesel engines made by Continental Aviation and Engineering Corp.—a two-cyl, 9.75 hp and a four-cyl 25.14 hp four cyl—were described in the Oct. 1 issue of AUTOMOTIVE INDUSTRIES. Details of construction of the two-cyl model are shown in the accompanying sectional drawings.



Lower Unit Fuel

By Alex Taub

THE basic factor that is exciting interest today in non-detonating engines or non-detonating fuel is the awakening to the need for lowering the unit fuel consumption. There appears to be no opportunity at all for lowering the overall fuel consumption. Requirements are necessarily expanding for the military, for industrial purposes, for agriculture and for public and private transportation. For the military, Admiral Louis E. Denfeld expressed the situation well. He said on Nov. 7, 1949, in Chicago, "In two wars, the Armed Services of this nation and those of our allies have floated to victory on a sea of oil." He further said, "The Services realize more than ever the importance of petroleum in military operations and are mindful that any plans for a future emergency must not only cover military supply but also the civilian economy. One is as important as the other."

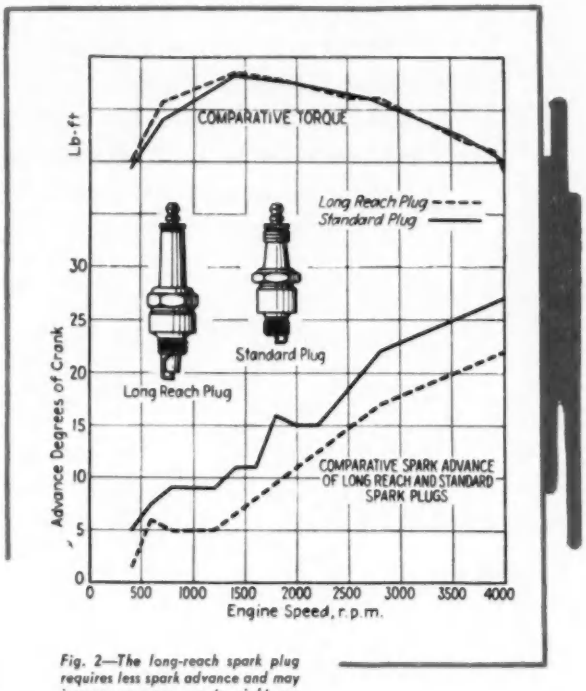


Fig. 2—The long-reach spark plug requires less spark advance and may increase economy up to eight per cent.

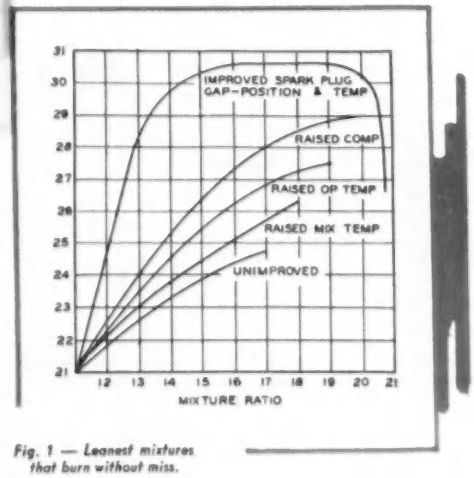


Fig. 1 — Leanest mixtures that burn without miss.

Admiral Denfeld also pointed out that, "During the week of April 24, 1945, the forces operating off Okinawa received 270,000 barrels of fuel per day." We know that there were many simultaneous Okinawas. The Admiral closed his remarks with the factual statement that the oil products needed by the Navy for 1950 will be 27,800,000 barrels. We must remember that the Army and Air Force are not covered in this estimate.

Eugene Ayres, Technical Assistant to the Executive Vice-President of Gulf Research and Development Co., in the December, 1949, issue of the *Scientific American* writes on the fuel problem and deals quite well with the probabilities of the transition from

Consumption A National Need

Since our four articles on "High Compression without High Octane Fuel" were published in AUTOMOTIVE INDUSTRIES, July 1, July 15, Aug. 1 and Aug. 15, 1949, we have received many communications from different parts of the world, mostly indicating that more progress in engines is needed by the motor vehicle industry. There seems to be a general feeling that a great deal more can be done with the engine that would fit into the scheme of fuel probabilities than is foreshadowed by current events on engines. Unquestionably engine progress is needed for several reasons. Engines have not progressed because 15 years ago their state of development was better than the rest of the vehicle. Today the balance is the other way in many cases.—*Alex Taub.*

liquid base raw materials to solid base raw materials for our fuel supply of the future. From his article we quote, "The human race has multiplied and reached its present thriving condition at the expense of a fantastically high rate of consumption of irreplaceable natural resources such as minerals and fuels . . ." "The only difference of opinion as to the threatened consequences is concerned with the time table . . ." "To appreciate the importance of the fuel problem one must try to imagine a world in which the manufacture of steel, clothing, drugs, books, food products, everything, gradually closes down." "This denouement is possible only if we stop using our technical wits, but is inevitable unless we apply knowledge which we do not now possess." Mr. Ayres could have stated this, "Unless we utilize all the knowledge *we now have* and much that we *do not now possess*."

In the last 10 years we have seen the vehicle population grow in this country from 30 million units to 43 million units, and it is rising fast toward 60 million units by 1955, and with it has come a growing reluctance to use coal for locomotives or heating of any kind, and the almost complete mechanizing of our farms. To some extent this movement has its limited counterpart all over the world. Civil aviation and marine are likewise increasing their use of liquid fuels and are likely to go on increasing this demand. We can be certain that there is little chance of a reduction of fuel requirements on any front, and if we can keep up with it we would like it that way.

One point seems clear today and that is we quite likely will proceed toward development of synthetic crudes with the tremendous investments that such a program entails.

There are two problems before us:

(a) To produce additional fuel within the framework of investment funds that are available.

(b) To reduce the unit fuel consumption.

We can no longer consider the production of fuel and abandon consideration of the source of raw materials and we should no longer consider the consumption of fuel and abandon the consideration of what the individual engine unit does with the fuel. Again quoting from Eugene Ayres of the Gulf Co., "Petroleum geologists find that while total additions to proved reserves (of liquid fuel) continue to come along in gratifying volume each year these additions are made up to an increasing degree of extensions and re-estimates of old fields. The number of new fields found each year remains about the same, but the fields are smaller . . ." "The indications are that we may already be on the descending part of the curve of discovery . . ." "But to be realistic let us consider the largest oil field ever found in this country—East Texas. The cumulative production of this field over the 18 years of its life so far has been 2.5 billion barrels. This is only a little more than a single year's consumption in the

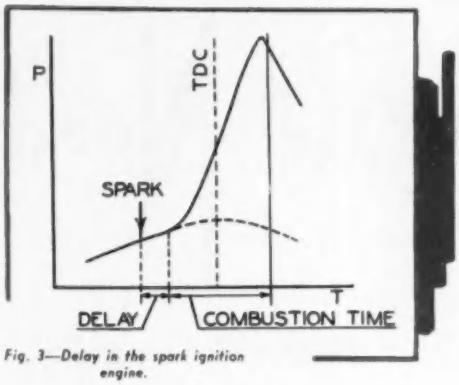


Fig. 3—Delay in the spark ignition engine.

U. S. at present, and less than the expected consumption for the year 1955. Another "East Texas" could postpone our peak of production only a few months."

This, then, is the fuel supply problem and we must leave it in the hands of the fuel producers. However, the automotive engineer must give heed to companion problem of fuel consumption by units.

To save fuel we must waste less, and to waste less fuel we must utilize it better in our engine equipment. The greatest opportunity lies in our gasoline-using motor vehicles and equipment.

We can never progress toward a major improvement in fuel consumption until we sharply divide the consideration for part throttle and full throttle. The maximum overall fuel savings must come from the vehicle part throttle operation and this saving could reach a total of 400 million barrels per year which at the rate of better than one million barrels per day would represent a nice new oil field. The potential saving is about 40 per cent of vehicle fuel consumption and could be more if we could work into our engine fuel consumption pattern all of the elements that we know would improve fuel consumption.

Since we are discussing potential progress, it would be well to deal with this subject in the form of a program for investigation. The four fundamental channels are for part throttle:

1. Higher compression ratio.
2. Improved thermal efficiency.
3. Burning of leaner mixtures.
4. Higher operating temperature.

These four channels could technically be considered as one—thermal efficiency. However, the vitals of progress get lost in the screening of such a broad classification. Under thermal efficiency we should deal here with the mechanical efficiency, lowering of heat loss and valve timing.

Higher compression ratio for full throttle is desirable for performance with smaller engines, but primarily it is an infliction requiring careful consideration of engine design. It is mainly needed for part throttle improvement in fuel consumption, because conditions within the combustion chamber improve with high compression for the burning of lean mixtures, greater thermal efficiency due to improved expansion, and a minimum of exhaust diluent. Studies for isolating the individual benefits of higher compression for part throttle will lead to many paths of progress.

The burning of lean mixtures represents another type of study which, while improving the thermal efficiency, progresses still faster in the direction of improved fuel consumption. Under this we should deal with the mixture ratio at which missing occurs in relation to changes in compression ratio, high operating temperature, valve timing, long reach spark plugs, wide gap spark plugs, coil potential, special ignition batteries, combustion chamber design for minimum heat loss, free exhaust, and manifold heat control and pipe design. Each group of investigations overlaps the other, and that is as it should be.

High operating temperature which affects all engine adjustments, opens the way to fuel saving on many counts. While admitting that there will be adverse adjustments to deal with, the overall effect will be a definite gain in fuel consumption. The most important gain will be improvement in thermal efficiency by virtue of lower heat loss and an improved mechanical efficiency. These are direct effects and the indirect effects may be just as important. The indirect will affect the leanest mixture ratio that will burn without missing due to the influence of heat on the initial mixture temperature and condition at the spark plug at the time of ignition.

The amount of work involved in the evaluation as

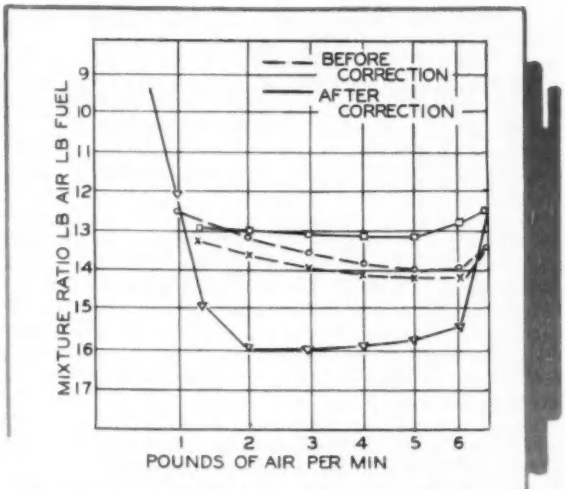


Fig. 4—Mixture ratio corrections for improvement in detonation, fuel consumption, and flexibility.

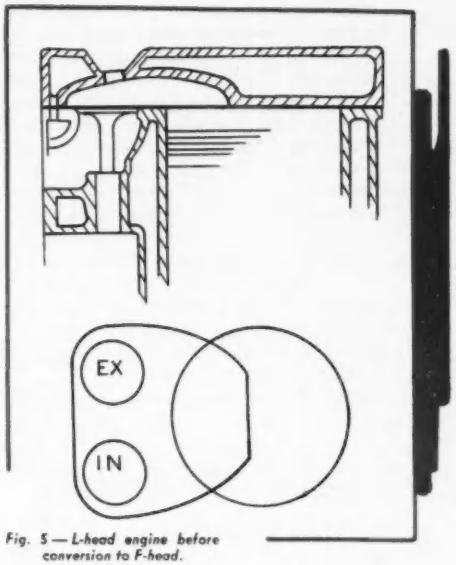


Fig. 5 — L-head engine before conversion to F-head.

outlined above might in the past have been a staggering project. However, today the test procedures have been simplified, requiring for part load a single curve for each condition at one speed. For part throttle the limiting factor is the miss point which can be detected in the manometers from the intake manifold or the exhaust manifold. Conditions are a constant speed preferably equal to 30 mph, a constant load equal to the vehicle driving load on the level, adjusting the throttle to maintain the load and speed, and adjusting spark advance for the best conditions of load and fuel. With the carburetor set at 30 per cent rich the mixture is leaned out by steps to the miss point, six to eight readings for each curve will usually be sufficient. A very good flowmeter for the fuel is necessary in order to eliminate many intermediate readings. This type of information should be plotted as shown in sample curves, Fig. 1. Such a procedure will indicate the relative importance of each step.

For full throttle fuel improvement we must deal with:

1. Highest useful compression ratio.
2. Thermal efficiency.
3. Internal cooling.
4. Detonation.
5. Shock control.

Items 1 and 4 can be dealt with by the chemistry of the fuel or by engine design. Items 2, 3 and 5 are engine problems exclusively. All of these problems would be solved with an inherent non-detonating engine such as the single valve. However, we deal today with something much less, and when we bring the part throttle and the full throttle requirements together, in present day engines we find conflicting cures, and it is this conflict that we must resolve. However it must be resolved with due regard to the probable type of fuel to be available and the available investment to produce this fuel in the quantities required. It is our opinion that progress will be served best by engine design and for this reason we deal here only with the engine phase.

A comparison of full throttle and part throttle requirements for improved fuel consumption shows:

Full Throttle	Part Throttle
Highest allowable compression ratio.	Higher compression ratio.
Improved thermal efficiency.	Improved thermal efficiency.
Improved detonation control.	Control of idle over-run.
Improved internal cooling.	Limited internal cooling.
Shock control.	Higher operating temperature.
	Leanest mixture that will burn without missing.

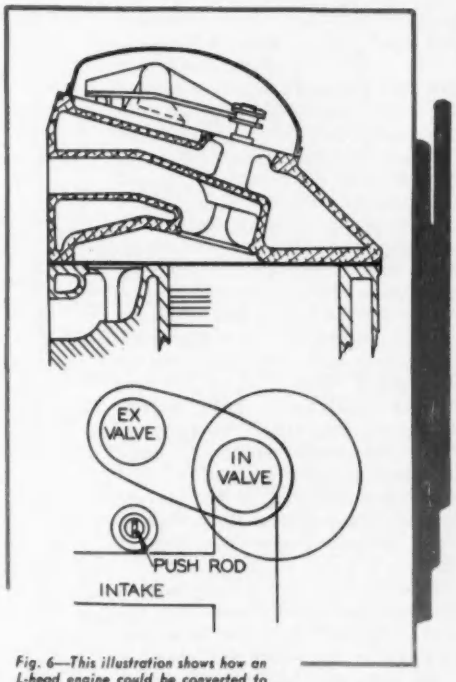


Fig. 6—This illustration shows how an L-head engine could be converted to an F-head type. The intake valve spring (not shown) would be located at the lower end of a special push rod arranged to pull as well as push.

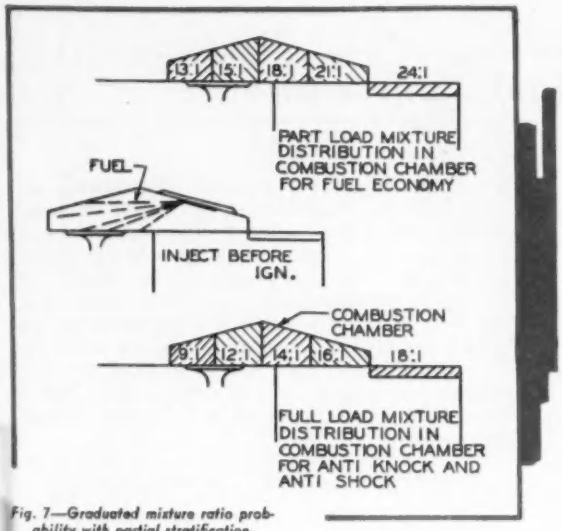


Fig. 7—Graduated mixture ratio probability with partial stratification.

Higher compression ratio is the most direct forward step and with it for part throttle there is little if any disadvantage. We may have to deal with "idle over-run" and part throttle acceleration spark knock. Both of these elements are affected by the spark plug, exhaust valve temperature, and also by the added part throttle spark advance. It is certain that when higher compression is used that the present added spark advance will be greatly reduced. The spark advance demand can be reduced by long reach spark plugs or wide gaps that tend to diminish the lag between ignition and flame progress for both full and part throttle.

Fig. 2 is an illustration of an old story on ignition lag. Here we see the difference in spark advance demand for two types of plugs. Prof. J. J. Broeze of Shell Laboratories, Delft, Holland, also recently emphasized this characteristic before the University of London in papers referred to us by Paul Schweitzer, Professor of Engineering Research, Pennsylvania State College. Fig. 3 shows the Broeze illustration of lag.

We know that burning time shortens with increased compression ratio, operating temperature, or rise in temperature within the combustion chamber by any cause even locally, and hence it is certain that a new deal on spark advance control is required for part throttle and full throttle when higher compressions are used or any change occurs in the temperature at the ignition area. Since ignition lag does exist and may be a variable due to constantly changing conditions of temperatures and mixture ratio within the chamber at the ignition area, and since the spark advance is geared to the crankshaft instead of the combustion chamber, we do have with us sometimes more spark advance than the conditions demand. This spark advance results in occasional violent pinging, particularly at part throttle acceleration, just when we think it is all cleaned up. The lean mixture of part throttle naturally takes more time to burn and when we add serious ignition lag due to design error, then the total spark advance for part throttle is long and quite often unwieldy within the limitations of the spark advance devices now in use. A higher operating temperature or mixture temperature may be the factor to iron out some of these variations.

Part throttle best mixture heating re-

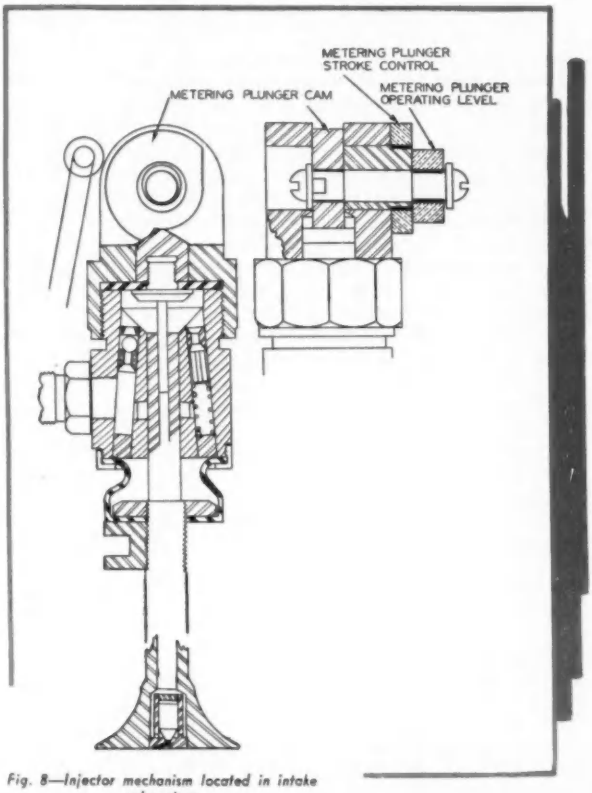


Fig. 8—Injector mechanism located in intake valve stem.

Lower Unit Fuel Consumption

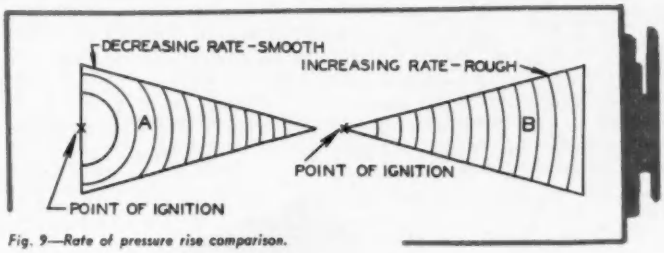


Fig. 9—Rate of pressure rise comparison.

quirements for good economy which are seldom reached today far exceed the allowable full throttle heat, and the devices used today do not provide a quick enough transition from hot to cooler, thus limiting full throttle compression ratios. Perhaps the answer to this will come with manifold design where two different pipes will provide the part throttle and full throttle mixtures and temperatures. This is particularly true if we expect to burn road-load mixture ratios of better than 19 to one, where we may require wide plug gaps, the plug set deep in the chamber, the hottest possible mixture, the maximum intake velocity for maximum part throttle turbulence, and highest possible wall temperature for full throttle operation. These part throttle "cures" would give trouble at full throttle and require for top loads special consideration including new spark plugs that would be durable when hot and separate piping from the carburetor with "cold" air and a low intake velocity so that we may not develop an unnecessary increase in the rate of pressure rise due to combustion chamber turbulence.* High compression ratio will automatically speed up the burn of part throttle and full throttle and it is this speedup that gives us our maximum improvement in fuel consumption for part throttle and our headache with the full throttle.

It is difficult to remember, yet dangerous to forget, that the internal combustion engine is gas cooled. Since in passenger cars the full throttle is used only ten per cent of the time we can, and do, provide additional fuel for cooling under these conditions without loss in tank mileage. Perhaps investigations are needed to determine for higher compressions how we can safely spread the difference between part throttle and full throttle mixture ratio still farther than in the past, which would add to the full throttle mixture ratio as much as we reduce the part throttle. This would add internal cooling and give an overall gain in fuel consumption.

Fig. 4 shows comparative mixture ratio curves of a European car with an undersize engine. This combination requires more throttle than any American car, yet here too we found that the full throttle mixture ratio could be richened and the part throttle leaned out for an overall gain in fuel consumption and flexibility.

It would be interesting to investigate a maximum overall engine performance improvement including fuel consumption of present day engines for a mini-

(*Turn to page* 58, *please*)

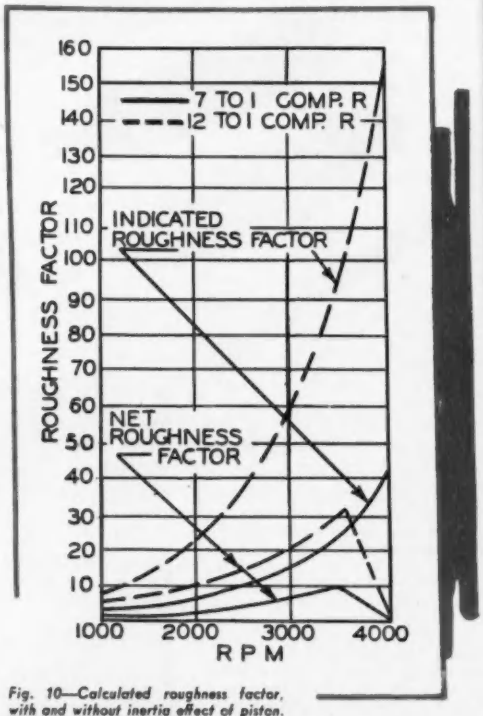


Fig. 10—Calculated roughness factor, with and without inertia effect of piston. These heads were not corrected for combustion smoothness. (12 to 1 estimated)

*See Prof. J. J. Broeze's lecture papers given before the Engineering Faculty, University of London, February and March, 1949.

Rod Caps Forged

Ten to the Bar

By Herbert Chase

AMONG the highest producers in number of forgings turned out per hour at the new Canton, Ohio, plant of Ford Motor Co. is a 2000-ton Maxipres equipped with a die for connecting rod caps. In this die, there are ten blocker and ten finishing impressions and it requires only two working strokes of the press to produce ten forgings. Normally the press can turn out 133 sets of ten forgings each in an hour.

(Right) Closeup of the Maxipres used for forging ten rod caps. The operator is transferring a set of forgings from the blocker to the finishing impressions.

(Above) Successive steps in forging rod caps ten at a time. The billet, left, is blocked in one press stroke and finished in the second stroke. Trimming is done cold, five caps at a time. Five caps appear at top right.

(Right) Removing a billet from one of the two Budd induction heaters that serve the press used for forging rod caps. Part of the air-operated mechanism for the second heater is shown at right. This mechanism feeds the billets through the heater.

The individual forgings weigh, after trimming, about 0.55 lb each and a set of ten are made from a single billet cut from SAE1038 round bar stock 1 13/32 in. in diameter and 18 in. long. Billets are fed by hand into the magazines of two Budd 200-kva induction heaters, and an automatic air-operated device feeds the billets into, through and out of the heater in a precisely timed cycle. Thus, a billet heated to 2250 F drops from each heater into a chute each 54 sec. Each billet is picked up with tongs by the press operator and is set over the blocker impressions.

When the press is closed, these impressions form ten block cap forgings, which, of course, are held together by the flash. After ejection, the set of blocked caps is set in the finisher impressions, which are spaced on the same centers, and the caps are sized in the second stroke. Upon ejection, a helper removes the finished set with tongs and deposits it in a tote box for removal to the trim press. He also blows out the die with a steam jet. Thus, it requires the full time of one man to do forgings and half of another man's time to load heaters. Output is 1330 caps an hour.

Trimming is performed cold in a die that shears flash from five caps at a time. The Bliss press used for this work is elevated so that, as the flash is sheared and the caps are pushed through the trim die, they can slide down a chute into a tote box placed on the floor. After trimming five caps, the flash, still attached to the other five caps is changed, end for end and is sheared off, using the same die. This is possible because the caps are symmetrical with respect to a vertical plane through the center of the row of forgings and spacing is the same at both ends.

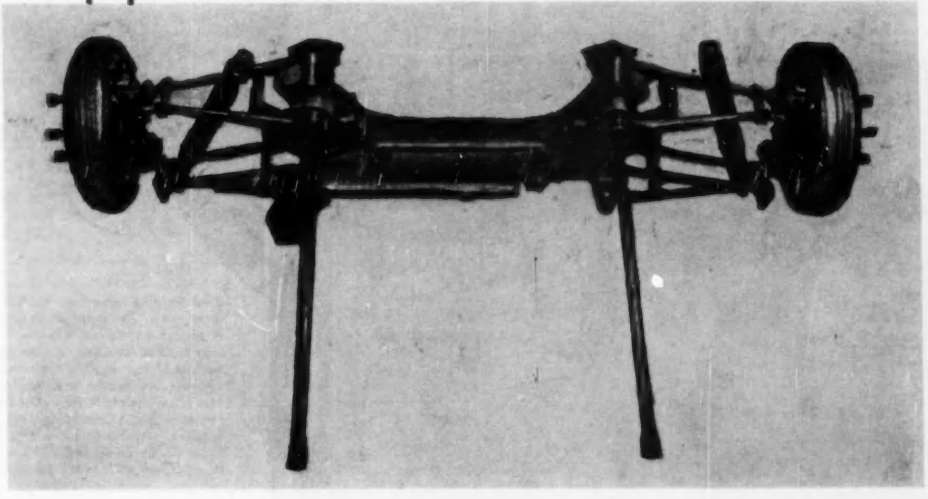
Steering Gear *Combined with* Front Suspension

THE new Veritas cars, to be built in part of the Mauser armament works located in the French zone of Germany, will have an unusual front suspension and steering gear assembly. A casting which carries pivots for the upper and lower support arms also houses the rack and pinion type steering gear. Longitudinal torsion bars are splined into the upper support arms.

At the rear is a de Dion axle with suspension by two support arms located below the drive shafts and splined to longitudinal torsion bars. A triangulated link attached to a ball joint at the center of the axle provides lateral stability.

Three models will be offered by Veritas—a sports car, with a 100-hp engine, a competition sports car with an engine developing 120 hp, and a racing model for which 140 hp is claimed.

Veritas front suspension and steering assembly. Illustration courtesy of The Autocar, London.

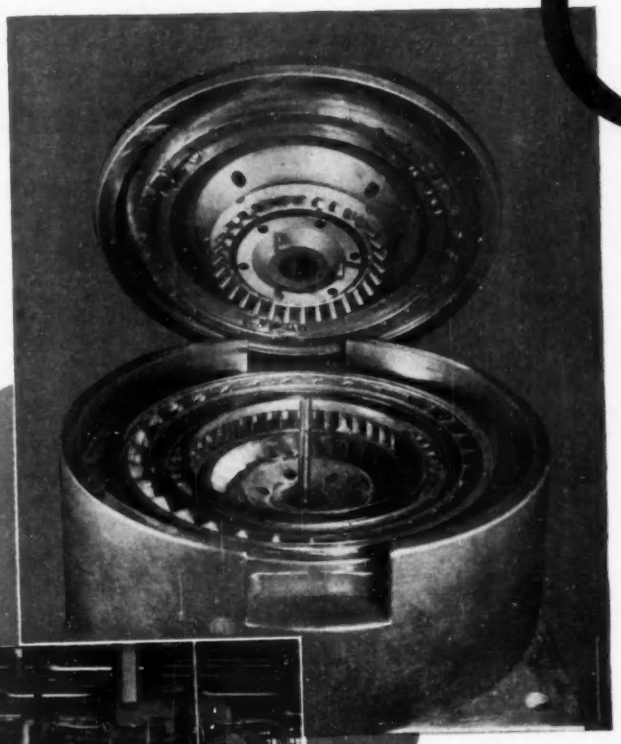


One of the most noteworthy features of Chevrolet's new Powerglide transmission (described in AUTOMOTIVE INDUSTRIES, Jan. 1, 1950) is the five element, multiple-phase torque converter which is fabricated entirely from a variety of steel stampings and represents a cooperative enterprise in which both engineering and manufacturing departments have had to work together for a common end.

The torque converter is being produced by the pressed metal division of the Chevrolet-Flint Manufacturing Division which was responsible for the development of dies, tools, and production techniques. Even casual study of the current set-up reveals that the Chevrolet process may be accurately termed "precision cold forming," resulting in unit assemblies of an unusual order of precision.

It is of interest that both the machining of parts for the gear box end and preparation of the complete Powerglide package are done in the new Chevrolet-Cleveland plant. A comprehensive picture of manufacturing activity in this plant will appear in an early issue of AUTOMOTIVE INDUSTRIES.

The fabrication of this comparatively intricate mechanism demands precision of high order, usually associated with machined parts rather than stampings. To produce a torque converter having specified design efficiency imposes unusually close tolerances on each individual part and particularly on the intricately formed and relatively delicate vane members. The problem is further complicated by the fact that



This massive inspection fixture is used for checking brazed primary pump assemblies. A row of flush pins—large circle of the upper half of the fixture — engages the top of each vane and indicates variations in height, if any, around the entire periphery. Similarly, the lower edge of each vane is engaged by the projecting pins in the smaller circle.

Spot welding operations on the secondary pump. The assembly in its fixture is placed on the carrier, which moves into position for seven tools to weld the bottom of the vanes to the outer shell. The machine indexes four times and the top of the fixture is then removed and the assembly is placed in the second machine, which welds the top of the vanes to the inner shell. This machine is equipped with seven tools and indexes four times.

This test strip from the progressive die for making turbine vanes shows the development of a completely formed vane—at the extreme right—in a series of 12 stages.

hevrolet's Torque Converter

How It is made of Precision Cold Formed Steel Parts

By Joseph Geschelin

since individual assemblies are ultimately copper-brazed to effect a permanent bonding, this requires perfect conformity of vane curvatures and fits within their housings to develop the intimate metal-to-metal contacts demanded for good brazing.

Briefly, the project required the design and fabrication of 120 major die items and more than 100 assembly fixtures of various kinds. Ten of the dies, primarily for the stamping of vanes, are of progressive type having from six to 12 stages. The rest are of blank, draw, and pierce type. All equipment has been designed to maintain unusually close limits.

Because of the close tolerances demanded in this operation, the raw material—cold rolled steel in strip and in coil—is specified with special tolerances, closer than commercial, requiring re-rolling to meet the specifications. For example, the strip stock for outer and inner shells of turbine and pump members is held to a thickness variation of plus or minus 0.001 in. Strip stock for the torque converter housing—one of the heaviest sectioned pieces of the assembly—is specified as 0.1793 plus or minus 0.005 in. Vanes are made of 0.0299 in. stock while the shells are of 0.0239 in.

The heavier stampings used for gear box parts, such as the clutch hub, are made of strip stock of 0.1345 in. thickness, produced with massive progressive dies.

Despite the close tolerances specified on the raw materials and the precision built into dies and tools, steps have been taken to assure conformity to dimensional tolerances and formations through the use of 100 per cent inspection fixtures and gages for individual parts as well as subassemblies and assemblies. To this end, Chevrolet has provided more than 200 special gages of various kinds.

The torque converter consists of five major elements — the pump, turbine, secondary pump, and primary and secondary stators. Each of these includes its own unique type of vane, the pump and turbine having, in addition, an extra set of vanes for the overrunning coupling element.

Since each element is composed, essentially, of a series of vanes mounted accurately within a shell, the basic operations for the entire unit may be appreciated from a description of a few selected parts.

Let us consider the vanes first. It may be noted that while vanes for each element differ in size and form, the method of producing them is about the same. The listing of vanes for the Chevrolet converter is as follows:

Primary pump	29 vanes	Secondary stator	23 vanes
Turbine	31 vanes	Overrun Coupling	
Secondary pump	31 vanes	Primary pump	45 vanes
Primary stator	25 vanes	Turbine	47 vanes

The above tabulation indicates that the complete assembly is composed of 231 vanes. The primary pump

Assembling vanes to the turbine inner shell by means of a specially designed fixture. The shell is positioned first, then the vanes are installed. A holding ring is then lowered around the outside and the upper portion of the fixture is placed on top and locked in position. The fixture then goes to the automatic welding machines for spot welding. A spot welded assembly is shown in the lower right hand corner, on the conveyor. The pump assembly operation follows the same procedure.

and turbine are elements of compound vane type with 74 vanes in the pump and 78 vanes in the turbine.

Vanes are made of 0.0299 stock, held to plus or minus 0.001 in., and are produced in progressive dies ranging up to 12 stations. Typical of press practice is the die and sample strip for turbine vanes, as illustrated. Stock is presented to the press in large coils, fed automatically by means of Littell roll attachments. As the strip feeds out, it passes through a series of levelling rolls. Each finished vane, such as the one shown at the right hand end of the strip, is completely formed and requires only a later restrike. It may be noted that the larger vanes are stamped out one at a time while smaller vanes are produced two at a time.

After stamping, vanes are tumbled in Sturgis wet tumbling barrels to remove sharp edges, then go to the annealing furnace. The last step is restrike after anneal. This is a rather ingenious semi-automatic, high speed procedure as illustrated. For this purpose Chevrolet has equipped a number of small, high speed presses with the Feed-O-Matic attachment supplied by Covert Mfg. Co. It consists of an automatically indexing table containing a number of work-holding blocks —eight in this instance—into which the vanes are loaded by the operator. A mechanical hand, synchronized with table speed and ram cycle, picks off the vane from one station, using vacuum suction for gripping, and drops it into the press die. Work is automatically ejected into a chute.

Vanes for the pump and turbine are also passed through a special Vapor-Blast, Liquid-Honing machine in which the parts are loaded in fixtures mounted on a continuous horizontal conveyor. The clam-shell fixture is designed to expose only the brazing areas of the work, the object of the operation being to produce a fine mat surface suitable for promoting an intimate flow of brazing material.

Shells for the various elements

Here is a perspective of the two enormous Lindberg hydrogen brazing furnaces used for brazing Chevrolet torque converter assemblies. This view shows the charging end, the trays being started automatically as the doors are opened.

Chevrolet Torque Converter

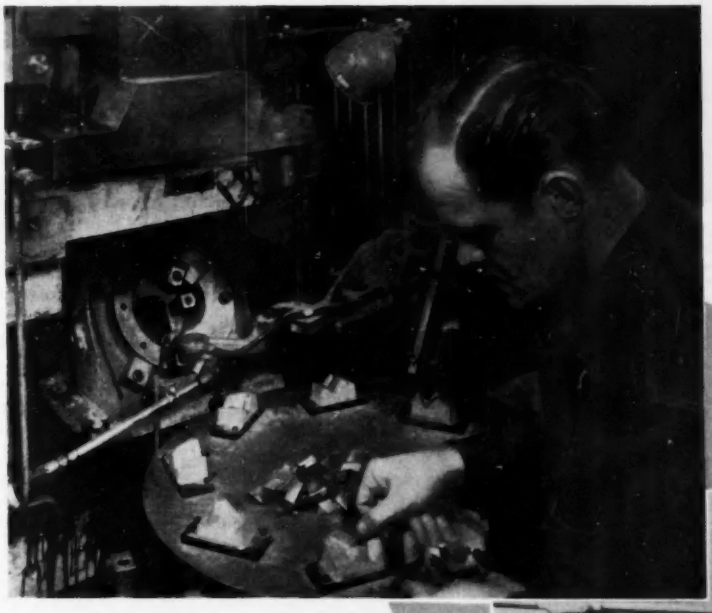
are made from 0.0239 in. cold rolled strip held to plus or minus 0.001 in. tolerance on thickness. They are produced by the usual blank, draw and pierce method. Following drawing they are annealed to eliminate strains, then subjected to a restrike to correct to specified dimensional tolerances.

One of the heavier and more intricately produced parts—the torque converter housing and tapping ring assembly—deserves detailed description at this point. Cold rolled steel strip, 0.1793 in. plus or minus 0.005 in. thick, is fed in short lengths to the first operation Clearing press for a combination blanking and drawing. Restrike follows in a 2000-ton Toledo press, an operation closely akin to coining, considering the close tolerances held on inside dimensions and concentricity. The third press operation takes care of trimming the OD and piercing the center.

Forming is followed by the assembly and welding of the tapping ring onto the flange, the ring being made in two sections. The heavy duty weld joining the ring and flange is made in two indexes in a heavy duty Federal resistance welder. After welding the stamping takes another restrike in a 2000-ton press to correct for any distortion incident to the heavy welding operation.

Next the housing is prepared for the ring-welding of two drain flanges. To this end two holes are rough-pierced, one at a time, embossed, then finish-pierced to size. The drain flanges then are ring-welded in a large special resistance welding machine. The part is then subjected to a water pressure test to assure tightness of the weld.

Since this is one of the basic parts of the converter assembly, quality control is quite extensive and performed 100 per cent. One setting in the special gaging fixture



Following anneal all vanes are given a restrike in small presses fitted with the Covert Feed-O-Matic attachment. (Safety guard removed.) The operator loads the vanes on the molded carriers fastened to the rotating table, which indexes to place them serially in the proper location. The swinging arm then moves into position and drops to pick up a vane by means of vacuum, returning to place it in the restrike die. As it returns for another vane the press operates to restrike the vane, which is then blown out to the rear by a blast of air.

Closeup of the Liquid-Honing machine for the preparation of primary pump vanes. The clam-shell carriers cover the body of the vanes, leaving the two flanges exposed to the vapor-blast.

Typical of heavy duty welding machines installed in this plant is this welder for joining the primary pump assembly to the housing. The assembly is pressed into the housing, then held in proper location under pressure of the ram-operated disk—shown withdrawn in this view. It is then spot-welded around the side. The welding head has four tools and the piston index lifts three times to produce 12 spot welds.

checks concentricity, held to 0.010 in. total indicator reading; and ID, held to a total tolerance of 0.010 in. In addition, the inspector checks contour with a gage template, flatness with a flush pin gage, and plug gages the drain holes.

It is important to emphasize that all of the light gage stampings—vanes and shells for all elements—are given a controlled anneal after forming and prior to restrike, to remove all strains. As an additional measure of control, the annealing temperature is precisely the same as the brazing temperature to eliminate any possibility of heat distortion. Annealing is done in a Lindberg bright annealing furnace of endothermic type, having a hydrogen atmosphere. This unit is 120 ft long, door-to-door, with three heat zones running some 30 ft in length. It is of roller hearth construction with Globar type heating elements. Annealing temperature — accurately controlled — is 2050 F. Total cycle time from loading to unloading is one hour and 10 minutes. Energy required to operate this unit is 630 kw. Net payload capacity is 2280 lb of metal per hour, exclusive of conveyor and basket weights.

Lindberg also has supplied a battery of two brazing furnaces of the same type as the annealing unit. Each of the brazing furnaces is 184 ft long, door-to-door, and has a 40-ft heating chamber consisting of four zones. These too are of endothermic type with hydrogen atmosphere and of roller hearth construction. Maximum brazing temperature is maintained at 2050 F.

The brazing cycle is faster, requiring only an hour from load to unload. Power load for each unit is rated at 730 kw. The capacity of each unit is 2280 lb of net load per hour, exclusive of conveyor and basket weights.

In the case of all three furnaces, the first heat zone is at a lower temperature, the object being to heat the parts to maximum temperature in gradual steps.

An interesting feature of the annealing furnace is found in the completely automatic conveyor system for loading and unloading the furnace. It consists, basically, of a long power driven roller conveyor parallel to one side of the furnace, and shorter transfer conveyors at each end. The entire system is synchronized in its action with the opening and closing of doors at the loading and unloading ends.

All of the component parts requiring annealing or brazing are transported to the furnaces on a monorail feeder conveyor line. These parts are picked off the conveyor by an operator who loads similar parts into baskets on the roller conveyor.

Consider now the assembly of one of the rotating elements. Even the simplest of these gives a typical picture of the general scheme of the operation. One of the illustrations shows an assembly bench on which the operators are in the act of installing vanes on a shell mounted in a massive work-holding fixture. It may be noted that such fixtures run around 85 lb in weight to assure accuracy in handling along the line. In the immediate foreground is a portion of the endless slat type conveyor which traverses the assembly benches and threads about the line-up of multiple-spot-welders. As the assembler completes his operation, he simply slides the fixture gently onto the conveyor.

Another view shows two of the many groups of automatic, multiple-spot welding machines used for spot welding the vanes to the shell. Generally speaking, primary pumps and turbine vanes are joined with three concentric rows of spot welds. One row is handled by the first welding machine, usually requiring

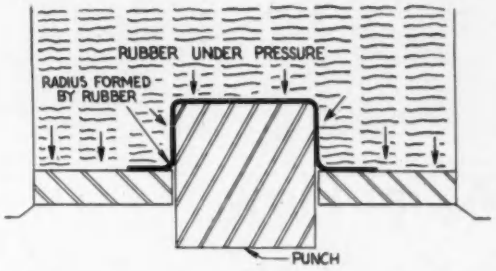
(*Turn to page 56, please*)

New Metal Forming Process

By H. H. Roberts

DETAILS of the Marform process for the forming of sheet metal parts have just been released by the Glenn L. Martin Co. This new process employs a simple punch for the male portion of the die and rubber under controlled pressure for the female portion. Its obvious advantage is a reduction in tooling costs, particularly where a multitude of different parts and a relatively low quantity of each part are required, although the process is by no means limited to short runs of this kind.

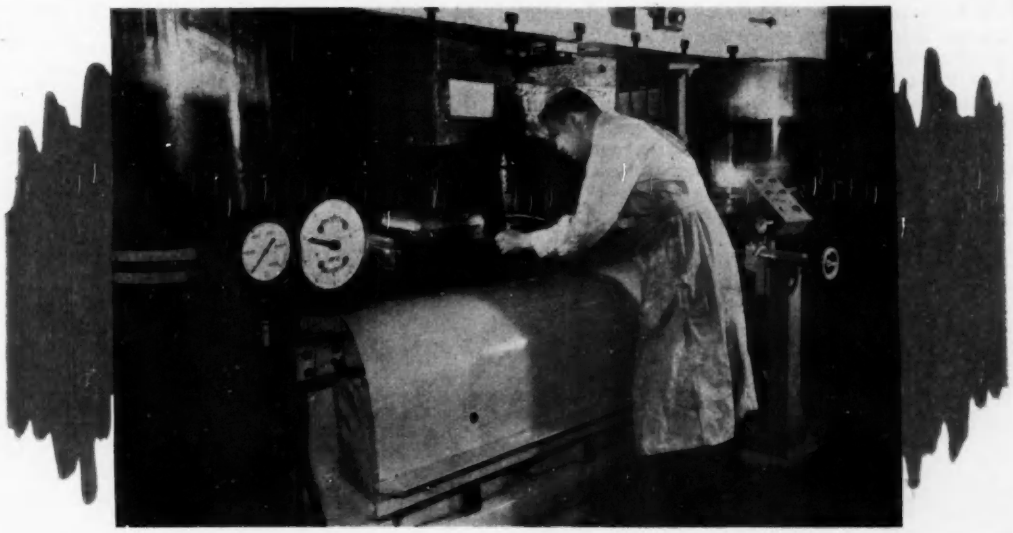
In addition to lower cost, the use of rubber for the female portion of the die is said to have several other advantages. One is a cushioning effect which prevents rapid application of strain on the metal. Another is the lateral pressure exerted by the rubber as a result of applied forming pressure. This lateral pressure has the effect of locking the metal already formed to the form block, thus preventing an accumulation of strain at the form block radius. As a result there is no localized concentration of strain in the part to cause trouble during its service life.

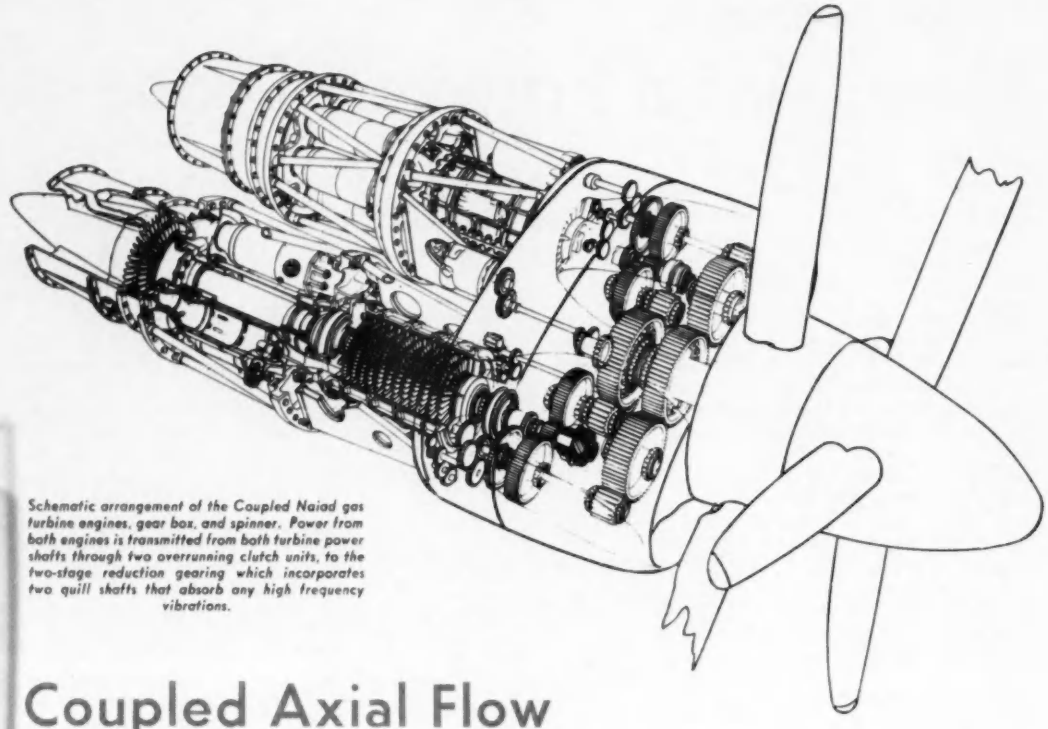


An important factor in the Marform process is application of an exact required pressure on

(*Turn to page* 55)

Form tool, pressure control, pressure indicator, and depth-of-stroke gage are shown in view below of a large hydraulic press set up for producing parts by the Marform process. The schematic illustration above shows how rubber under pressure allows material to shrink without wrinkles during the forming process.





Schematic arrangement of the Coupled Naiad gas turbine engines, gear box, and spinner. Power from both engines is transmitted from both turbine power shafts through two overrunning clutch units, to the two-stage reduction gearing which incorporates two quill shafts that absorb any high frequency vibrations.

Coupled Axial Flow Turbine Engines *Drive Contra-Rotating Propellers*

An addition to the line of Napier aircraft-engines produced by D. Napier & Son, England, is the company's first coupled power unit, the Coupled Naiad. Briefly, this unit comprises two axial-flow propeller turbine engines anchored side-by-side to a gearbox through which they drive centrally disposed contra-rotating propellers. The gearbox houses a two-stage reduction gearing which incorporates couplings and twin overrunning clutch mechanisms by means of which the propeller loads are distributed evenly between both engines. In addition, this system allows one engine of each unit to be stopped in flight to obtain a greater economical cruising range.

To take full advantage of the propeller turbine engine the diametral size must be kept to a minimum and to this end all detail design was directed. The ducted spinner gives the Coupled Naiad maximum advantage from ram-effect and a contour that merges with the gearbox casing to give an exceptionally smooth continuous line. To maintain this low drag contour the gearbox casing incorporates the necessary intake

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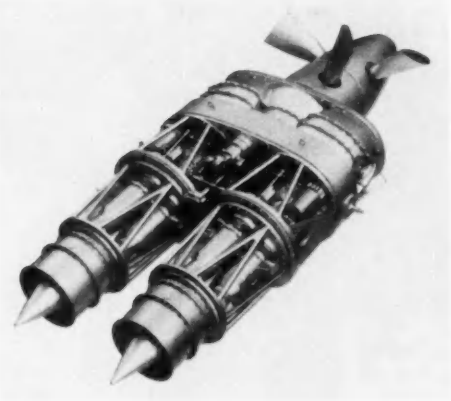

Rear view of the Coupled Naiad shows the location of some of the accessories and one of the central support plates used for mounting the unit. It is estimated that the turbo-prop unit mounted in a suitable aircraft will provide a maximum speed of 400 mph.

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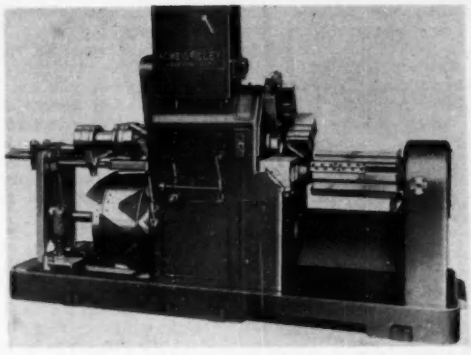
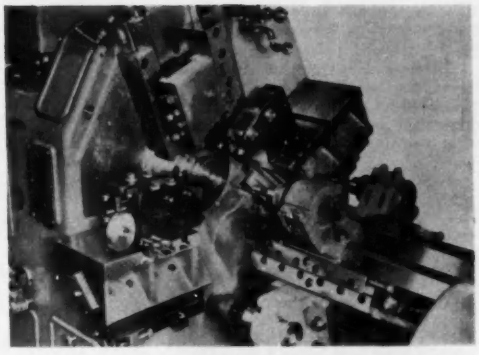


Acme-Gridley single spindle automatic bar machine Model M, in sizes 2⅝ in. to 5½ in.



Close-up reveals three cross slides and five end working slides, each independently operated.

J-29—Automatic Bar Machine

Newly designed for the most productive useage of carbide tools, the Model M Acme-Gridley single spindle automatic bar machines brought out by the National Acme Co., Cleveland, Ohio, provide quick change from job to job, and a ten-times faster production than the company's older Model L machines.

In the large open tooling zone two lower cross slides of the Acme-Gridley angular mounting type provide opportunity for heavy forming operations; a third slide is provided for cut off. The indexing turret has five slides for end working and stock stop. Threading can be performed with self-opening dies or collapsible taps. The machine features no interferences with mechanical shafts from either side of the open type tooling area.

The turret is indexed with an independent motor by a Geneva movement located in the outer support. The lock bolt disk and the lock bolt are also located in this housing. This is entirely independent from the toolslide and other machine movements. With this independently controlled indexing mechanism, it is possible to index the turret one or more toolslides.

Spindle drive is from the pulley shaft through change gears to a jack shaft, thence to a clutch shaft where, three clutch-controlled range gears provide as many as three different spindle speeds without changing the spindle change gears. Automatic control of the range gear clutches is from main camshaft.

Idle time movements and others operated by the main drive motor but not directly connected with the feed control, are accomplished by the constant speed shaft driven directly from the pulley shaft and independent of the spindle speed or feed. This fast speed is controlled automatically or may be engaged by a separate hand lever.

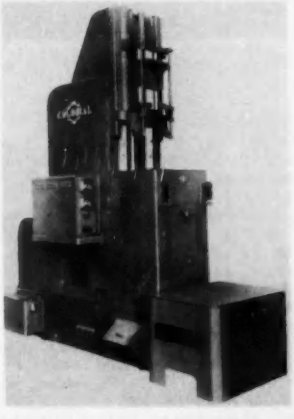
The cross slides or forming slides are independently operated by steel cams located directly underneath the slides, while a third cam set provides independent operation of the cut-off slide. Each of the turret slides is also independently controlled by steel cams located on a cam drum in the headstock section. All slide movements can be cammed independently and synchronized with each other. This camming versatility together with automatic spindle speed control, provides great flexibility in tooling this machine — making it completely mechanical.

Main drive motor is a standard 60 cycle AC 1800 rpm motor (50 cycle 1450 rpm for export machines); a DC motor can be supplied. The Model M is expected to be furnished in sizes 2⅝ in., 3½ in., 4¾ in., and 5½ in.

Feed control for the main camshaft is by direct drive from the main spindle. The standard range of toolslide feed per spindle rpm is from 0.0040 to 0.0444 in. The machine can be arranged to provide a coarse and fine feed range in addition to the standard one, using the same cams and feed change gears. Feed change gears and spindle speed change gears are interchangeable.

J-30—Redesigned Broaching Machines

Development in the broaching machines produced by Colonial Broach Co.,



Colonial broaching machine with group-mounted standardized hydraulic controls; a similar electric control panel is located on other side of column.

Detroit, Mich., including single and dual ram surface broaching machines, and pull-up and pull-down internal broaching machines, is the redesign of these machines to conform to the new standards of the Joint Industry Conference. All electric controls are group mounted in the single external dust-protected panel. All hydraulic controls are similarly group mounted outside of the machine on the panel on the opposite side of the machine column. Motorized pumps are so located that they can be changed in a matter of approximately one hour's time. Filters consist of individually replaceable cartridges externally accessible. They are replaceable, as are hydraulic control valves, without draining the system of the machine.

Electric and hydraulic controls themselves have been standardized for interchangeability and their location and arrangement permits easier incorporation of automation.

J-31—Soft Metal Die Stamping

Chambersburg Cecostamp, using dies of softer metals

The Chambersburg Engineering Co., Chambersburg, Pa., announces establishment of a new die service for the convenience of Cecostamp users. The Cecostamp, a sensitively controlled air operated impact drop stamp capable of forming a wide variety of shapes from all the formable metals with a blow of any degree of intensity required, was originally developed for formation of sheet metal aircraft sections. Sections of buses, automobiles, small boats, agricultural machinery, etc., are among products now being formed with the Cecostamp. With Cecostamp, dies made of relatively soft metals may be used. These dies are poured instead of being cut from solid metal, and may economically be re-melted for future use whenever desired. Development of a zinc alloy die foundry at Chambersburg makes a ready source of these dies available to both prospective and current Cecostamp users.

Manufacture of zinc alloy dies at Chambersburg either from customer's sample part or from drawings are in accordance with current recognized techniques. First step is construction of a plaster pattern made to conform with a finished sample part or drawing. Accurate allowance is made for shrinkage of the zinc alloy in the pattern. From the finished plaster pattern a sand mold is made from which the die is cast.

Zinc alloy dies are particularly recommended by Chambersburg for stamping operations where economy is more to be desired than long production runs as in experimentations ventures, etc.

NEW • PRODUCTION • EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupon on page 54

J-32—Die Testing Machine

Lester Engineering Co. announces a new die testing machine said to open and close dies with such accuracy that the parting line can be matched perfectly before the die leaves the tool room, affording no flash in the casting room.

Claimed to end expensive and dangerous efforts by a team of die makers in matching parting lines, and to end "bluing in" a die and the checking of slides and moving cores, operation is as follows:

The two halves of the die are clamped to the two machine platens. The bottom platen moves down and then moves out horizontally. The die is then at a convenient height and out in the open so that it can be easily reached and worked on. It can then be quickly moved in and up, in perfect alignment for checking.

Engineering-wise, the machine is claimed unique in that the oil cylinders are located inside of two of the vertical columns. The bottom plate is the movable one—yet there is no need for a pit to accommodate an oil cylinder. Though the vertical travel is 36 in., the machine fits under a 10 ft ceiling.

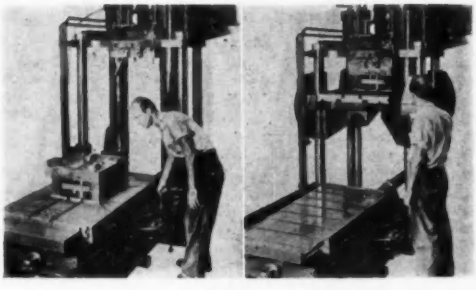
Locking pressure is 50 tons. Having minimum die height of 14 in.; vertical die opening of 36 in.; daylight when fully open of 50 in.; and horizontal stroke of die table 52 in.; the die table size is 28 by 58 in. Approximate machine weight is 15,000 lbs; with overall height 112 in., overall width 68 in., overall length 136 in., and motor rated at 10 hp.

J-33—Largest Metal Forming Press

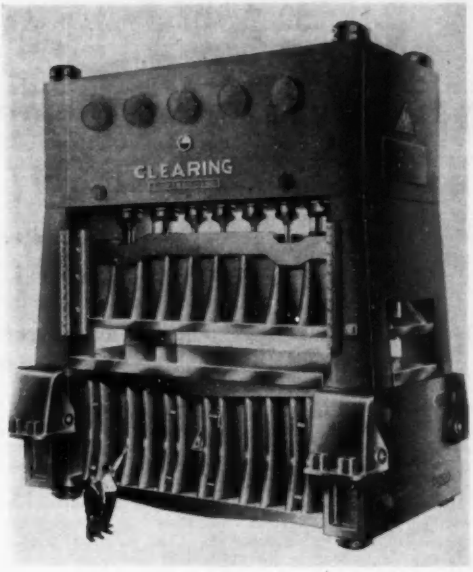
Largest metal forming press of its type ever built—a monster 38 ft long and weighing more than 1½ million lbs. —just completed by Clearing Machine Corp., Chicago, Ill., is to be shipped across the Atlantic to France for forming essential parts of railway car and bus structures.

Each major part of this tremendous press is a single piece of metal, for the basic design of the machine is exactly the same as regular Clearing presses of lesser size. The largest single component is the bed, which is the anvil against which the machine exerts its force. Bed is 440 in. long and weighs 175 tons. The bed can receive dies which are 84 in. by 350 in. for forming that size single sheets of metal. Generally, the press will form channels and rails from metal plates nearly ½ in. thick.

The crown, containing the huge gears that drive the slide mechanism, is another heavy structure. A 200 hp. motor, working through the gears, will force the slide downward with a maximum pressure of 3500 metric tons (3850 U.S.).



Lester die testing machine in two phases of operation



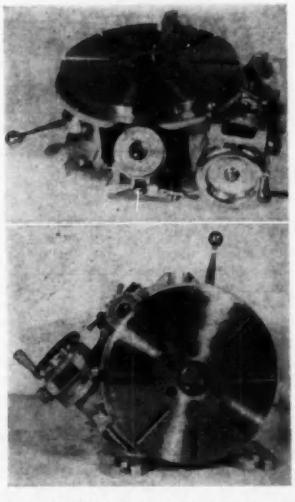
Immensity of this 3,850 ton Clearing press is dramatically demonstrated by pygmy proportions of the two men shown beside it in this artist's conception of the structure.

If the entire bed area were used, this would be more than 250 lbs for each sq in. of it. The slide moves 24 in. downward to deliver this blow, and then returns to open position, all in less than eight seconds.

A still larger press is scheduled for installation in a Texas plant, Clearing reports.

J-34—Indexing Table

New OPL optically controlled rotary indexing table put out by the F. T. Griswold Mfg. Co., Wayne, Pa., is designed as a companion instrument to the company's OPL dividing head. The OPL table has the same features and general construction as the OPL dividing head, but is intended for use in the horizontal position as with normal types of rotary tables, plus operation in the vertical position.



Griswold OPL indexing table in horizontal and vertical position

The indexing table permits operators of milling machines, jig borers, die sinkers, etc., to index, rotary mill and divide their work with a speed and accuracy not usually possible with mechanically controlled equipment. Accuracy of the instrument's optical control and rigidity of its construction permit use of the index table both to take the loads of machining operations and for delicate inspection operations as well.

All settings of the OPL indexing table are made through the medium of a system of lenses which work in conjunction with a master reference drum carrying 360 finely engraved lines equally spaced about its periphery. This system of lenses picks up and reproduces these reference lines so that they appear readily visible through the viewing glass, even at a distance of 12 inches (normal reading distance).

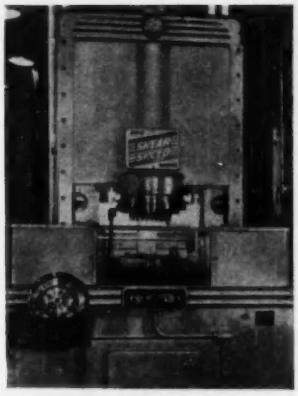
To set the table the platen is rotated until the reference line representing the number of degrees of movement desired is centered betwen two parallel graduations engraved on the reticle in the optical control. For movements of less than one degree, this reticle can be moved by rotation of the micrometer dial graduated in increments of 30 in. (seconds) so that by pre-selecting the minutes and seconds required the table is quickly and accurately set to even the smallest values.

J-35—Internal Gear Cutting Machine

Availability of Shear-Speed machines for cutting of internal spur gears, splines and other miscellaneous forms has been announced by Michigan Tool Co., Detroit, Mich.

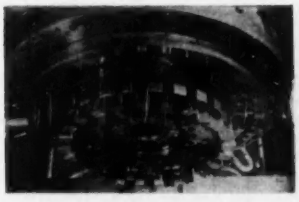
Almost any irregular shape can be cut providing it lends itself to form-cutting with radially fed tools. Minimum size ID which can be handled is 5.4 in.; maximum ID is approximately 20 in. In some cases even smaller and larger gears can be cut.

In operation, the "internal gear" Shear-Speed machines simply reverse the tool-feed action of the machines used for cutting of external forms. Using two inverted cones, the tools are fed outward before each stroke of the reciprocating work and its holder. They



Michigan Shear-Speed tooled for cutting 48 internal involute teeth in a 12 in. diam housing

are retracted slightly before the return stroke to prevent tool drag. Feed is decreased to finish-feed as proper depth



Worm's eye view of typical tool head on a Michigan "internal gear" Shear-Speed machine. "Single point" form tools are used.

of cut is approached. Two or three strokes at exact depth (without feed) are generally used to "clean up" before the head retracts and the machine stops for reloading.

The first of the internal gear machines put into service is stated to

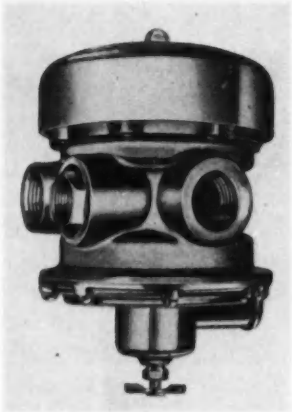
(*Turn to page 53, please*)

NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 54

K-62—Vacuum Relay Valve

Maximum braking is obtained in one-third the usual time with the new vacuum emergency relay valve recently introduced by the Midland Steel Products Co. of Cleveland and Detroit. Tests are said to have demonstrated greatly increased braking efficiency especially on high speed stops and on steep down grades when brakes are applied for an appreciable length of time.



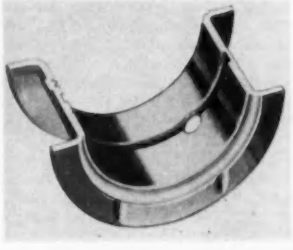
Midland emergency vacuum relay valve

Incorporated in this new Midland emergency vacuum relay valve is an open type check valve, eliminating the previously required separate, remote mounted check valve. Also built in, is a moisture trap with drain cock, and "tank" valve. The tank valve design makes the new unit 25 per cent lighter than the total of the parts it replaces.

Rate of brake application has been stepped up because the new built-in tank check valve automatically closes off the manifold connection to the reservoir when the vacuum in the brake chamber balances the vacuum in the reserve tank. This permits the motor to speedily build up maximum vacuum in the vacuum chambers without further evacuating the tank until the brakes are released.

K-63—Copper Lead Bearing

Developed as a result of wartime aircraft research, precision-made main and connecting-rod aircraft type copper lead bearings are being equipped on all gasoline-powered Federal trucks manufactured by the Federal Motor Truck Co., Detroit, Mich. Known as "F-77," the bearings consist of a steel back onto which a cast copper alloy is bonded. The inside of the bearing is electrically coated with a combination of lead and tin. The coating process, according to Federal, increases bearing life, reduces main and connecting rod maintenance costs and assures longer power-plant life.



Federal main and connecting rod aircraft type copper, lead bearing, "F-N"

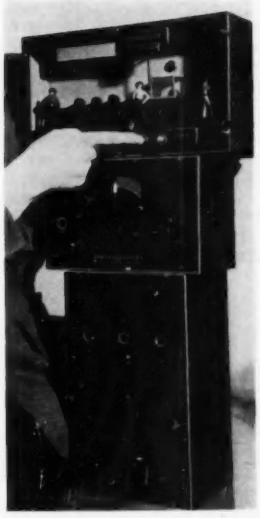
K-64—Low Hydrogen Electrodes

Being produced by Harnischfeger Corp., Milwaukee, Wis., is a complete line of low hydrogen electrodes of 14 different types covering all welding applications where low hydrogen electrodes are desirable. Each has been thoroughly tested in P&H's laboratory and in their own welding production as well as in the field. The coatings were developed to produce deposits low in hydrogen, thereby eliminating the under bead cracking. These new P&H electrodes produce excellent welds on problem steels and other alloy steels, including steel castings. They have a moderate penetrating arc with an easy to remove slag.

K-65—Electric Computor

Unveiled by General Electric Co., Schenectady, N. Y., is a new electric computor for assuring highest possible quality of most mass-produced items, while at the same time reducing manufacturing costs.

The electric computor, called a "quality control indicator," keeps automatic, continuous check on reject rates in manufacturing operations, and permits the location and remedy of abnormal production difficulties as quickly as they occur. The instrument eliminates time-consuming computations which lag behind production by hours or days in the statistical analysis of production and rejection rates. On an assembly line the device counts the number of items produced and the number rejected, and indicates on a meter whether the percentage of rejections is above or below an acceptable level at any given instant.



G-E electric computor. The calculating equipment is contained in the two lower cases. Large box on top is a model production line to demonstrate how the equipment works.

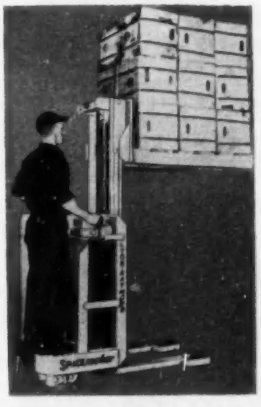
The indicator uses various signalling devices—an "electric eye" or a switch tripped by passing objects. When an inspector rejects a unit he pushes a button, which causes a change of reading on the indicating meter. When the reject level at an inspection station exceeds a pre-determined rate, the needle on the meter moves from the green half of the scale to the red half, indicating to supervisors that corrective action is needed.

Indicating equipment need not be set up near the production line, but may be installed in the offices of supervisory personnel or at large, centralized instrument panels.

Basic equipment consists of two units: a "totalizer," which counts the units inspected, and a "characteristic analyzer," which counts the rejects for a given characteristic checked by inspectors. The "quality" meter, showing whether rejections are above or below a pre-determined level, is mounted on the front panel of the characteristic analyzer.

On the front panel of each characteristic analyzer is a selector on which the acceptable reject rate may be set, based on production experience. In general it is necessary to use only one totalizer for each production line, and a characteristic analyzer for each characteristic being checked by inspectors.

K-66—Electric Tiering Truck



Lyon-Raymond Corp., Greene, N. Y., announces entry into the electric power lift truck field with this electric tiering truck of decided maneuverability. Termed the Space-Maker, the truck will tier 48 in. by 48 in. pallet loads at right angles, from a six foot aisle. In congested warehouse departments it will tier 24 in. by 36 in. box skids at right angles from a five foot aisle. This very maneuverable truck is at present furnished in three different types —platform type, for tiering skids; fork type, for tiering single face pallets; and straddle type, for tiering two faced pallets.

K-67—Motor Starters For Cold Weather

Capsules the shape and size of a robin's egg and containing basically an ethyl-ether compound, are on the market for cold-weather starting of the

System using "vitamin capsules" containing an ethyl-ether fluid for starting cold passenger car motors, as demonstrated at laboratory of California Oil Co. Demonstrator is priming the starting fluid, released from the capsule, into the combustion chamber. Driver compartment adapter is at upper left; capsules shown at lower right.

motors of pleasure cars, following wartime development of the compound for the U. S. Armed Forces on the Alcan Highway, and also later use, primarily on trucks, tractors, buses, other commercial vehicles and heavy industrial equipment subject to low temperatures. The packaged fluid for quick engine starting is product of the California Oil Co., New York, N. Y.; the capsules are made by the Gelatin Products Div. of the R. P. Scherer Corp., Detroit, Mich.

These "vitamin-acting" capsules for cold motors hold the liquid compound, called Chevron starting fluid. With aid of an applicator they are said to enable cold engine starting in less than ten seconds in temperatures as low as —25° F.

The system comprises an exposed plunger, reservoir, and primer, installed in the driver's compartment on the dash board or the post under the steering wheel. The rest—coiled copper wire and an injection nozzle, are under the hood attached to the induction system of the intake manifold.

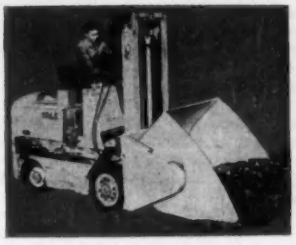
On a wintry day, with temperature at zero or below, the driver, unable to start his car the normal way, slips a capsule into the reservoir and presses the plunger. The instrument punctures the capsule, releasing the fluid. The driver then primes the liquid, forcing it through one or more atomizing nozzles attached to the intake manifold.

Mixing with the air, the atomized fluid when subjected to the ignition spark, explodes and warms the combustion chamber, preparing it for the intake of the normal fuel. Explosion occurs because the fluid has an extremely wide explosibility range as compared to petroleum hydrocarbons. Also, it has a much lower ignition temperature. The fluid is burned up immediately and the effect is almost instantaneous.

Diesel, as well as gasoline motors respond successfully.

K-68—Scoop-Shovel Truck Attachment

The Yale & Towne Mfg. Co., Phila., Div., comes forward with a new hy-



Yale & Towne scoop-shovel

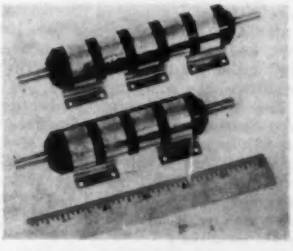
draulically-operated scoop-shovel which eliminates manual shoveling when scooping, lifting, moving, and dumping sand, coal, gravel, grain, dry chemicals and similar loose materials.

The scoop-shovel accessory attaches to the Lift King and Worksaver electric and gas fork trucks for operation within the plant, in the plant yard, and in box cars and highway-truck trailers.

The scoop handles up to 27 cu ft of material. It tilts upward from the horizontal scooping position to cradle the load during transport, and tilts downward to completely discharge the load when dumping. The device scoops at the ground level or digs into piled material. It dumps loads into bins, vats, hoppers, mixers, and other receptacles at heights up to 130 in.

K-69—Miniature Speed Changers

Gear reductions as high as 750,000 to 1 are now available in the line of miniature speed changers offered by the Metron Instrument Co., Denver, Colo. These special units are made up by



Metron miniature high ratio speed changers

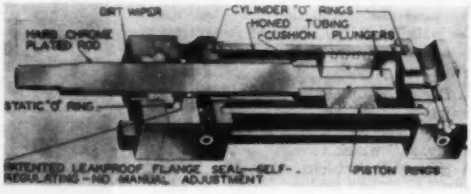
adding one or two additional gearing sections to the standard three-section units having ratios up to 3375 to 1. This provides several hundred ratios between 1000:1 and 750,000:1 in addition to 500 or more standard 1, 2 and 3 section units.

Input speeds as high as 50,000 rpm, and output torques up to 2 lb-in. are permissible. Very high ratios in hobbed gears and "zero backlash" construction can be furnished at reduced torque rating. Weights of 4 and 5 section units are approximately 6 and 7 oz, respectively. Body diam is 1.050 in.; body lengths are 3 15/16 in. for 4 section units and 4¾ in. for 5 section units.

The addition of still another section with a maximum ratio of over 11 million to 1 is structurally practical, but so far no application for such extremely high gear reduction is said to have been found.

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 54



Miller high pressure hydraulic cylinders

K-70—Oil-Impregnated Metal Bearing

A new type oil-impregnated sintered metal bearing, known as the Haller oil well bearing, is being offered by Michigan Powdered Metal Products Co., Inc., Northville, Mich.

This bearing is said to introduce a method of forming a cavity of uniform

Haller oil well bearing of Michigan Powdered Metal Products Co.

size in the center of a bearing wall. As oil or grease is impregnated into the sintered metal by static pressure, it fills this cavity or pocket as well as the pores in the sintered metal body itself. This results in a much greater oil content than is possible in conventional bearings of this type, it is claimed.

Increased lubricating quality plus a stronger bearing material, permit it to take heavier loads than conventional sintered bronze or sintered iron bearings, and practically eliminates "freezing" under the most adverse operating conditions, the company states.

The reservoir behind conventional type bearings is eliminated. Because the oil is sealed in the body of the bearing, there is no dripping of oil from the bearing. Bearings can be hardened and ground and can be impregnated with oil or grease for different conditions.

Haller oil well bearings are supplied in three types. The pocket type which has an open cavity is particularly suited for heavy load bearings. In the sponge type bearing, the pocket is filled with sponge iron to provide capillary action for retaining the oil. This bearing is recommended for conditions where it is subjected to heat. In thin wall bearings, a group of small holes replaces the pocket so that the structure of the bearing wall is not weakened.

The bearings are adaptable to a wide range of applications where conventional sintered metal bearings are normally used. They are especially adapted to pillow blocks. They are particularly suited for motor bearings and for use with large diameter shafts. Their "non-freezing" characteristics make them ideal for guide pin bushings, according to the company.

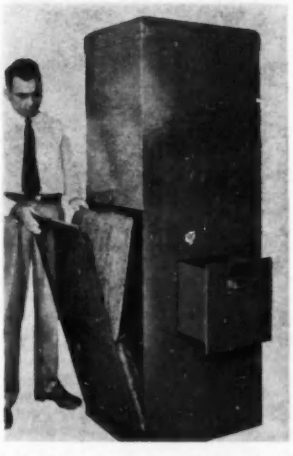
K-71—High Pressure Hydraulic Cylinders

High pressure hydraulic cylinders that meet the recently approved J. I. C. Hydraulic Standards are now being offered by Miller Motor Co., Chicago, Ill.

The cylinders are available in a complete standard line, from 1½ in. to 12 in. bores for 2000 to 3500 psi operation, have solid steel heads, caps, and mountings, and, according to the manufacturer, meet all the specifications and recommendations of the "Standards" that specifically relate to sealing devices, cylinders, and pistons. "O" rings provide the required leakproof pressure sealing at cylinder ends; a patented leather rod seal assembly permits friction-free leakproof operation of the reciprocating rod; boring the cylinder tubing to a 15 micro-in. polished finish within 0.0005 tolerance more than meets the cylinder bore finish prescribed by the "Standards"; dirt wiper seals adequately clean the rods; hard chrome plating the solid steel piston rod provides the additional rod hardness necessary to prevent scoring; automotive step-cut piston ring piston assemblies are available and are interchangeable with the standard Miller leakproof leather piston cup seal assembly which is recommended for use where "no leakage can be tolerated." Air bleeds are available to prevent air entrapment; also cushioning at one or both ends is available on the same mounting dimensions as non-cushioned cylinders.

K-72—Dust Collector Portable Unit

New type "M" portable industrial heavy duty dust collector unit, furnished in three models of 450, 900 and 1800 CFM at high velocity, are offered by the Kirk & Blum Mfg. Co., Cincinnati, Ohio. These heavy duty collectors can be set up anywhere to serve one or several machines, eliminating costly



Kirk & Blum heavy duty portable dust collector unit, type "M", size MM

pipe runs to remote plant areas where only one or a few machines are located. Each unit is compact, self-contained and ready to operate.

The type "M" units handle dust from grinding, buffing, and polishing metal-working machines and similar dust sources. Each unit consists of motor, exhauster, centrifugal pre-cleaner and steel wool filter after-cleaner.

The dust laden air is delivered to a small diameter high efficiency, centrifugal pre-cleaner where all but the finest particles are removed. The air then passes through steel wool filter pads, three inches thick, for final cleaning.

Motor and exhauster are completely isolated from dust. The units are completely fire proof. Housings are extra heavy. Exhausters are heavy duty industrial type, direct connected to a 3600 rpm 220/440 volt motor.

K-73—Fatigue Testing Machine

Filling a wide gap in the capacity range of Baldwin-Sonntag Universal fatigue and simulated service testing machines, a new machine of 10,000 lb total capacity (5000 lb maximum static preload plus 5000 lb maximum alternating force), known as the SF-10-U,

Baldwin fatigue testing machine, Model SF-10-U

is a product of the Baldwin Locomotive Works, Phila., Pa. The machine applies alternating vertical forces at a frequency of 1800 cycles per min and maximum amplitude of ½ in. Load accuracy is within 2 percent of load or 0.4 per cent of capacity, whichever may be the greater. The machine is driven by a 2 hp synchronous motor.

The new fatigue machine operates by the same constant-force principle as other SF type fatigue machines. Dynamic loads are applied by the centrifugal force of a mass rotating at constant speed in an oscillating frame. The force is accurately controlled by varying the distance between the mass and its center of rotation. Inertia forces are compensated by carefully designed springs and calibrated weights.

In addition to the features of other fatigue machines of this type, the machine accurately maintains static preloads up to 5000 lb during tests. Preload is automatically reset to the predetermined value whenever an electrical contact is made by a slight change in the length of calibrated loading springs (induced by creep in the specimen or other cause). A relay circuit then activates a motor to drive preloading screws.

All load-receiving parts are mounted in an inner machine frame which is seismically suspended by springs in an outer frame so that no perceptible vibrations are transmitted to or received from the floor.

The machine has a reciprocating platen near the center of its work table on which a spring, held securely by a fixture bolted to the top of the frame of the machine, is set up for a test. The right side of the control panel has start and stop buttons, acceleration control knob, and a reset type revolution counter to register stress cycles applied to specimens. Controls at the machine's left are for the automatic preload mechanism.

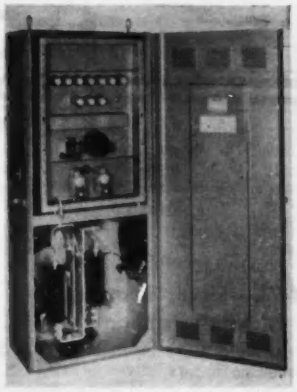
The machine occupies a floor space 59 by 67 in. and its work table is 44½ in. high with an area 52 by 60 in. on which to accommodate specimens or full size machine elements or assemblies.

K-74—Resistance Welding Equipment

Two new, all-electronic, high-speed resistance welding control equipments, for synchronous and non-synchronous operation, are available from Westinghouse Electric Corp., Pittsburgh, Pa. The equipments have no moving parts in power and control circuits except initiation and solenoid relays, offering advantages in weld quality, welding costs, and ease in which welds are produced.

Basic control panels consist of the plug-in Rectox rectifier tube firing panel (for non-synchronous units) or a heat-control firing panel (for synchronous units). These basic controls include also the 3-B sequence weld timer, which controls squeeze time, weld time, hold time, and off time for a single impulse spot welding. It provides non-synchronous timing with repeat and non-repeat control and non-heat control. The substitution of a precision weld-time panel for a 3-B or 5-B sequence weld timer provides synchronous precision control when the heat control panel is used.

These combinations are sufficient for many common resistance welding control requirements. However, space is also provided for the easy addition of auxiliary control panels. Auxiliary control panels include a-c forge timer, d-c precision-type forge timer, wave-shape control, voltage compensator, initial-squeeze attachment current regulator, temper sequence weld timer, dual weld attachment, interlocking relay attachment—which enables use of one

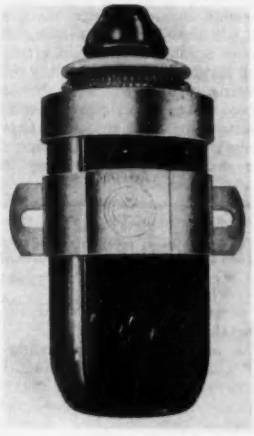


Westinghouse electronic resistance welding control equipment

welding control with two welding machines—dual weld interval attachment, and a Timatic control attachment. The latter is a control system that automatically pre-selects and pre-sets the correct resistance welding current for the thickness of the metals being joined.

The cabinet housing this equipment provides ample room for installation and servicing the ignition tube firing panel, the sequence weld timer panel, and auxiliary control panels, as required.

K-75—Ignition Coil



Ignition coil developed by Mallory Electric Corp., Detroit, Mich., built in both 6 and 12 volt capacity, and especially designed for buses and trucks. Called the Mallory Best Coil it is stated to have sufficient voltage and current in the secondary circuit to deliver a good spark at the plug even though the spark handicap is great. Also, contact flashing is claimed to be greatly reduced.

(*Turn to page 52, please*)

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 51)

K-76—Silver Brazing Alloy Package

Handy & Harman, New York, N. Y., announce a new silver brazing alloy package which should prove convenient for users of this product. It contains 5 oz of 1/16 in. diam Easy-Flo-45 wire. "Torch Brazing Instructions" are included; also a "Quick Facts" folder telling the advantages to be gained by brazing with Easy-Flo-45.

K-77—Puncture-Sealing Tubeless Tire

The puncture-sealing tubeless tire, goal of the rubber industry since automotive ages dawn, is introduced by the B. F. Goodrich Co., Detroit, Mich., to be available to Michigan motorists. The tire is said to provide a tread in which the new tougher, longer-wearing "cold rubber" is used, air being retained in the tire instead of in an inner tube.

On the wheel the tubeless casing looks no different than an ordinary one. However, inside, the tire has a special first ply that provides a thin, effective barrier against diffusion of air. And a thick layer of puncture-sealing material covering the crown and shoulder of the casing provides protection against punctures by nails or spikes that ordinarily would result in a flat tire. Whenever sharp objects pierce the tire and are withdrawn the gummy lining is drawn into the hole to seal it permanently against the loss of air.

The new tire resulted from wartime BFG research on special tubeless tires for military vehicles and on the bullet-sealing fuel cell for aircraft.

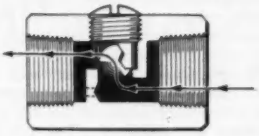
The new tubeless puncture-sealing tire is claimed to be safer, more comfortable to ride on; have 10 times better retention of air than the best prewar tire and tube; to be easy to mount on a wheel; and to run from 15 to 25 per cent cooler than a regular tire and safety tube. In absence of an inner tube, it is explained, heat is dissipated through the conductivity of the steel wheel.

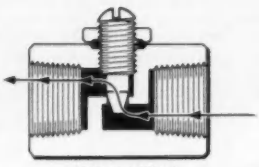
K-78—Valves for Air and Hydraulic Service

Two new valves for air and hydraulic use have been introduced by Pneu-Trol Devices, Inc., Chicago, Ill., designated respectively as a vernier type needle valve and a floating ball check valve.

The check valve provides extreme sensitivity of the floating ball to open fully or to completely close at the slightest change in flow direction; also, the check valve is readily converted to a fixed orifice control valve by drilling a pre-determined reerse flow orifice through the entry port of the valve body.

The needle valve's long tapered needle allows a fine vernier adjustment, essential to air and hydraulic service.





Pneu-Trol check valve and needle valve.

Made of hexagon bar stock in brass for pressures to 1000 psi and steel for 5000 psi, all internal parts are of stainless steel.

K-79—Side-Shifter Truck Attachment

The Yale & Towne Mfg. Co., Phila. Division, presents this hydraulically operated side-shifter attachment for use with both the Lift King and Worksaver fork trucks. The device shifts the forks as much as four inches to the right or left of center. This increased flexibility saves storage space by permitting "spotting" of loads in odd corners, close to walls, near pillars, or in other confined transfer and storage areas. It is pointed out that a side-shifter when shifted to either limit permits utilization of more than 11 additional cu ft of space per single stack of 40 in. long pallets, tiered to a height of 10 ft. In addition, the side-shifter eliminates manual positioning in enclosed spaces in trailer trucks and freight cars. When desired, the side-shifter is easily detached.

STRUCTURAL FOILS FOR GREATER STRENGTH

(*Continued from page* 26)

the same as strips of wood or other material.

The core is now being made from 24SF aluminum, but experimental samples have been made of steel, paper and Conolon. Conolon, using unidirectional Fiberglas core material, has shown very great compressive strength in tests. Core material from aluminum foil has shown compressive strengths comparable to the yield strength of the aluminum itself. The core is being produced in many thicknesses, and can be fabricated from many different gauges of aluminum to produce densities or strengths to suit diversified applications.

Bonds between the core material and skins of metal and Conolon have been made that show high tensile strengths. A very exacting test of the bond between core and skins is a peel test using thin ductile skins. Bonding techniques using suitable combinations of Narmco's Metlbond adhesives show very good peel strengths.

A testing program was completed using 0.002 in. 24S aluminum core that had a density of 3.5 lb per cu ft. The core was bonded to aluminum blocks for testing in compression, tension, shear and to aluminum skins for testing in peel.

• PRODUCTION • NEW EQUIPMENT • PLANT •

For additional information regarding any of these items, please use coupon on page 54

(*Continued from page* 47)

have already cut 5000 gears of 12 in. pitch diam without requiring a tool grind. Machine cycle time on this job was 24 secs for an hourly production of 85-90 parts.

When necessary, tools are reground as on other types of Shear-Speed machines by locking the individual form tools together on the magnetic chuck of a surface grinder and merely removing a few thousandths (0.010-0.015 in.) from the top face of the tools, simultaneously. No other grinding is necessary.

J-36—Metal Shearing Machine

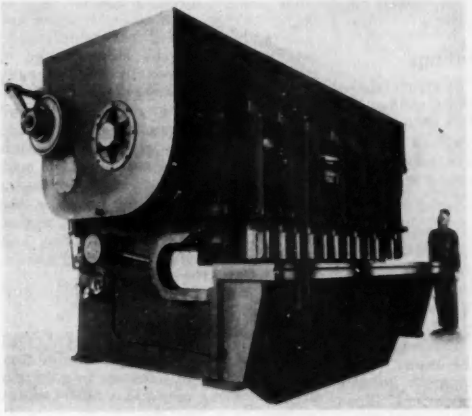
The largest Steelweld shear completed by the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has a shearing capacity of 12 ft of one-in. steel plate. Although this is the heaviest Steelweld shear, it is not the longest, for Steelwelds have been built for cutting plate up to 18 ft.

Making use of a pivoted-blade cutting principle the machine has no slides or guides for the knife to work in. The upper blade operates on two heavy pins secured to the side frames, and travels in a circular path.

A Micro-Speed knife adjustment permits fast change of knife clearance to suit various thickness plate, accomplished by turning a hand crank and watching a dial indicator that shows clearance in thousandths of an in. The indicator also shows the plate thickness that may be cut for any knife setting.

The shear cuts at rate of 25 strokes per min. Throat is 24 in. deep—standard for all Steelwelds. Both frame and blade are of all-welded one-piece steel construction. Frame bed and crown are welded integral with side frames. The bed has ball bearing transfers to facilitate movement of steel through the knives.

Control of the machine is effected by a movable electric foot switch connected to the shear by a cable to a receptacle at the front. Knife and holddowns are fully protected by a heavy plate-type guard. A complete line of Steelweld shears is available for cutting all size plate up to 20 ft by ¾ in.



Cleveland largest Steelweld shear

J-37—Double Spindle Disk Grinder

A double spindle disk grinder for high production precision grinding of parallel surfaces of ball-bearing races, thrust washers, seal plates, symmetrical parts, and other similar parts, is latest equipment manufactured by Charles H. Besly and Co. of Chicago, Ill., and Beloit, Wis.

The new machine (Fig. A) is equipped with a bar-type truing device arranged for truing the abrasive members with either diamonds or ballbearing type star cutters. It has 30 hp motors with V-belt drive to two grinding spindles equipped with super-precision bearings which carry 30 in. disk type abrasive wheels.

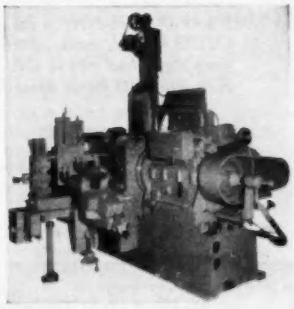


Fig. A—Besly double spindle disk grinder

A power-driven, continuous-chain type feeding fixture (Fig. B), with two continuous chains carrying equally spaced drive lugs, carries the work between the abrasive members as it is received from the two magazine loading fixtures. The latter are equipped with a vibrating device to assure continuous flow of parts to the feeder at high operating speeds.

The size of the finished parts is controlled by a fixed tungsten carbide anvil and a reed mounted movable tungsten carbide anvil which actuates an air jet connected with a Sheffield Airlectric gaging head. This gaging device actuates the feeding mechanism of the grinding wheels to control size.

Designed to produce a maximum of 30,000 ball-bearing races per hr, this machine will handle work from ¾ in. to 9½ in. in diam and from 3/16 in. to ⅞ in. in width. A typical report from machines now in use is said to indicate that outer races 0.218 in. wide and 1½ in. in diam can be ground at the rate of 200 per minute per rail, and with the double fixture will produce a total of 24,000 finished races per hr, removing approximately 0.007 in. stock and producing work which is parallel within 0.0001 in. and holding dimension from piece to piece within 0.0005 in.

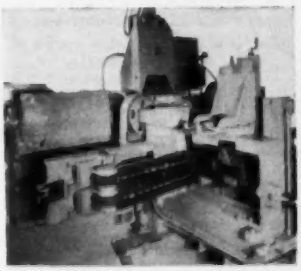


Fig. B—Power-driven continuous-chain type feeding fixture on Besly grinder

Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-53 Protective Coatings

The Atlas Mineral Products Co.—Bulletin 7-1 on Protective Coatings for industry is available. This bulletin contains information on coatings suitable for protection against corrosive fumes or splash on steel, concrete and wood surfaces.

H-54 Broaches

American Broach & Machine Co., Div. Sundstrand Machine Tool Co.—An attractive new catalog, No. 450, has been announced. The catalog is in color, and contains two sections—number one is devoted to broaches, the many types available from the company. Section two, Machines and Applications, illustrates internal and surface broaching operations in which the broach, fixture and machine are designed and manufactured by American Broach.

H-55 Gages

Cadillac Gage Co.—A new 36-page catalog covering the entire range of gages manufactured by the company has been published. The catalog illustrates all of the gages manufactured by the company and contains charts showing the many various sizes available as standard. A section of the book is devoted to charts giving practical information of every day use for the users of these products. The section also contains charts on Unified and American Standard Screw Threads, Thread Gage Forms, etc.

H-56 Soldering Flux

Handy & Harman—A new liquid flux developed especially for use in gold and silver soldering operations has been announced in a new descriptive bulletin, No. 18.

H-57 Electrodes

Hobart Bros. Co.—A 16-page electrode catalog contains descriptions, data on applications, welding procedures, mechanical properties and specifications of electrodes in the company's line.

H-58 Speedomax Recorders

Leeds & Northrup Co.—An illustrated 4-page folder describes the company's new Speedomax X-Y Recorder. Operating principles of the instrument are described with the help of a simplified schematic diagram. Specifications, including ranges, response speeds and construction details, are also given. Photographs illustrate the compactness and ease of operation.

H-59 Universal Boring Fixtures

Ex-Cell-O Corp.—A new 4-page pictorially illustrated Universal Boring Fixture folder is available. It lists both manual and hydraulic operated fixtures available for use on all styles of Ex-Cell-O Precision Boring Machines. Construction features and specifications for each style of Fixture are listed.

H-60 Drilling, Reaming, Punching Tools

Whitman & Barnes—A new general catalog describes, lists and illustrates tools used in drilling, reaming and punching operations. Included are drills and reamers made of high speed, carbon, cobalt steels and Tungsten carbide and interchangeable punches made of carbon and high speed steels.

H-61 Oil Bath Air and Gas Cleaners

The American Air Filter Co., Inc.—

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A new manual covers new designs and improvements in their Cycoil Oil Bath air and gas cleaners. Selection charts, dimension tables and detailed engineering data are included.

H-62 Torque Converters

Detroit Diesel Engine Div., General Motors Corp.—A new, illustrated booklet The New General Motors Diesel Engine — Torque Converter Unit, gives complete information concerning what a torque converter is and how it functions—where and how it has been applied—performance curves for the various models, etc.

H-63 Lock Nuts

Palnut Co.—Two interesting case histories are described and illustrated in a new 4-page color folder. Advantages are listed and a drawing shows the double-locking action of the Palnut Lock Nut.

H-64 Tenite Extrusion

Tennessee Eastman Corp.—The third edition of Tenite Extrusion is available. The 28-page book gives up-to-date information on equipment and choice and handling of material for continuous extrusion of Tenite I, Eastman cellulose acetate plastic, and Tenite II, Eastman cellulose acetate butyrate plastic. Special sections deal with extrusion of Tenite tubing and Tenite sheeting.

H-65 Gear Hobbers

Gould & Eberhardt, Inc.—Catalog No. 233 shows the latest line of G & E Universal Manufacturing Gear Hobbing Machines. Complete specifications, descriptions, and illustrations of these machines and various attachments are supplemented by illustrated production examples.

New Metal Forming Process

(*Continued from page* 43)

the material while it is being formed. This pressure variation can be infinite between minimum and maximum values, and is directly correlated to the stroke position of the machine. Pressure is built up by movement of the press before forming of the metal takes place and has no connection with the hydraulic system of the press although pressure on the rubber is hydraulically controlled. This arrangement permits the use of either mechanical or hydraulic presses.

Steel punches are generally employed for production runs, especially on harder sheet metal. However, softer material such as cast Kirksite may be used for the punch in some applications.

The flat plate on which the sheet metal rests is made of steel. Its surface must be flat and smooth but the fit between it and the punch is unimportant except when forming very thin metal. A covering of other material such as molded panel stock is sometimes used on the steel plate for short runs to eliminate grinding of the plate's surface.

Reduction in area of 57 per cent is considered normal for Marform work on aluminum alloys, and reductions as high as 70 per cent have been attained in testing operations. A cup depth equal to 1.5 the radius is average for the same materials, although depths up to 2.4 times the radius have been made in some instances. Wall thickness in deep drawn parts is maintained practically uniform from the blank to the finished article and materials of different thicknesses can be formed with little or no change in tooling.

The Martin Co. is currently employing hydraulic presses of 800 tons and 3500 tons capacity for its Marform work. The 800 ton press is used in conjunction with a Marform unit with a 16 in. by 18 in. forming area which provides a forming pressure of 5560 psi. The 3500 ton press is used with a 28 in. by 31 in. forming area and a forming pressure of 7000 psi. Speed of the smaller press is 120 cycles per hour which may result in a multiple of that number in pieces per hour since more than one piece may be formed at one time. The large press operates at a speed of 60 cycles per hour and can be set up to form several parts on the same stroke.

Further investigation is being made in order to find wider applications for the process; in the development of allied tooling for secondary operations, and in simplification of the equipment.

The Marform machine can automatically and simultaneously shear material in any direction to the forming stroke, a feature which also is under development.

Martin's metal forming units will be manufactured and sold by Hydropress, Inc., New York City. As has been its practice for some months, the Glenn L. Martin Co. will continue to make available the surplus capacity of its own Marform units.

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity declined moderately during the week ended Feb. 4. Railway freight loadings, crude oil output, bituminous coal production, and construction were lower than in the preceding week, while department store sales and electric power production increased. The *New York Times* index of activity for the week ended Feb. 4 stands at 150.4, as compared with 153.6 in the preceding week and 150.8 a year ago.

Sales of department stores during the week ended Feb. 4, as reported by the Federal Reserve Board, equaled 227 per cent of the 1935-39 average, as compared with 222 in the week before. Sales were one per cent below the corresponding distribution in 1949, as against a preceding advance of two per cent. The total in 1950 so far reported is six per cent less than the comparable sum in 1949.

Electric power production increased contraseasonally during the week ended Feb. 4. The output was 4.9 per cent above the corresponding amount in 1949, as compared with an advance of 2.6 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 612,524 cars, 3.8 per cent less than the figure for the week before and 10.2 per cent below the corresponding number recorded in 1949.

Crude oil production in the week ended Feb. 4 averaged 4,945,100 barrels daily, 10,850 less than in the preceding week and 462,400 under the comparable output a year ago.

Production of bituminous coal and lignite during the same week is estimated at 6,540,000 net tons, 960,000 less than the output in the week before and 4,845,00 below the corresponding quantity in 1949.

Civil engineering construction volume reported for the week ended Feb. 9, according to *Engineering News-Record*, was $141,900,000, or 12 per cent less than the preceding weekly figure but eight per cent above the comparable sum in 1949. The total recorded for six weeks of this year was 34 per cent more than the corresponding amount in 1949. Private construction for the period was 27 per cent above that a year ago, and public construction increased by 42 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Feb. 7, at 151.6 per cent of the 1926 average, was 0.3 per cent more than in the preceding week but was 3.1 per cent below the corresponding figure in 1949.

Member bank reserve balances decreased $267 million during the week ended Feb. 8. Underlying changes thus reflected include decreases of $474 million in Reserve bank credit and $50 million in gold stock and an increase of $57 million in money in circulation, accompanied by decreases of $271 million in Treasury deposits with Federal Reserve banks, $40 million in nonmember deposits and other Federal Reserve accounts, and $5 million in Treasury cash.

Total loans and investments of reporting member banks declined $551 million during the week ended Feb. 1. An advance of $47 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, $13,918 million, shows a net decrease of $1400 million in 12 months.

Chevrolet's Torque Converter

(*Continued from page 42*)

four automatic indexes of the work piece to complete the weld. The second machine, in most cases, takes the remaining two rows simultaneously using a multiple welding tool. Here too the work is indexed four times.

In the case of the secondary pump, the shell is held in the fixture by means of a detachable member of the fixture at the top. This remains in place for the first welding operation, as shown at the left, the first row of spot welds serving to hold the vanes securely in place. The operator between the first and second operation machine removes the hold-down section before the fixture is routed to the second operation at the right.

Assembly of the pump and turbine—which require the addition of the overrun clutch—is naturally more complicated and requires additional steps. In the first stage, the vanes are spot-welded to the inner shell. Meanwhile the overrun clutch sub-assemblies are assembled into their respective inner and outer shell by a special procedure. This is an almost automatic procedure in which the circular indexing table serves to transport the work from one station to another. At the first station, the tiny vanes are fed into the outer shell by means of an automatic hopper, dropping one vane at a time while the shell is indexed automatically for each vane. Upon completion of this operation, the table indexes the fixture to the second station where the bottom of vanes is staked to the outer shell. The unit then indexes to a third mechanical station where the tops of vanes are staked to the inner shell, which has been placed in position by the operator between the second and third stations.

In essence, therefore, the assembly of each individual rotating element requires, first, the spot-welding of vanes while positioned in massive fixtures to assure proper alignment; then after inspection this is followed by brazing to assure complete integration.

Generally speaking, Chevrolet prepares assemblies for brazing with a variety of techniques, including dipping of an entire assembly, spraying sections of an assembly, and hand painting of the liquid copper solution, as well as combinations of these. The primary pump, being a more complicated element and composed of more individual parts, requires considerably more preparation. Because of loose parts which are assembled with light squeeze fit, this assembly is placed on a stand having carbon supports that fit into the inner ring of the overrun clutch so as to hold the outer shell and all parts within it in contact by their own weight as they go through the brazing furnace. In addition to the copper solution that is added by dipping and spraying, this assembly also is fitted with copper brazing rings over two diameters just before the assembly enters the furnace.

Great care is taken to apply just enough brazing material so as to prevent excess and heavy deposits. Previous to brazing, excess copper is permitted to drain out the open ends of the inner and outer shells. Any accumulation that may remain along the edges is removed later when the shell ends are removed by machining.

The primary pump assembly also requires considerable preparation after brazing. For one thing, the OD is sized in a 400-ton H-P-M hydraulic press. This is followed by grinding the top of the vanes, grinding the lower edges of the vanes, and machining the rear face of the outer shell hub. The finished assembly is checked 100 per cent, one of the gaging fixtures being shown here. This massive fixture has flush pins—which may be seen around the large diameter of the upper section held by the operator. These pins contact each of the vanes at the top edge and this face plane is held to close limits. Similarly, the pins projecting from the inner ring of the same fixture contact with the inner edges of the vanes.

Finally, when the primary pump assemblies have been properly qualified they are ready for assembly with the housing, described earlier. Two of the principal welding operations are illustrated here. In the first of these, the pump element is pressed into the housing and held down firmly under pressure by the ram-clamped disk which may be seen withdrawn in this view. While thus held in place, the assembly is welded to the housing by spot welds on the outer periphery. Then the work is shifted to the big National welder where the pump is spot welded to the hub of the housing from the inside. This operation is handled in two indexes.

Coupled Axial Flow Turbines

(*Continued from page 44*)

ducts for connecting the ducted spinner with the compressors. The auxiliaries of both turbine units are grouped around the compressors in such a way that they do not exceed the gearbox diameter.

The present Coupled Naiad is designed to provide up to 3415 hp. With a maximum height diameter of 30 in. the engine is well suited for accommodation in the wing of medium to large aircraft.

The two propeller turbine engines are identical and are independently served by their individual accessories. Each engine, described in AUTOMOTIVE INDUSTRIES, Feb. 15, 1949, consists of an axial-flow compressor that delivers air to five combustion chambers; the products of which are delivered to a gas turbine that drives both the compressor and the propeller.

The fuel pump, oil metering pump, and tachometer for each engine are all driven from the reduction gearing contained in the gearbox. The lubrication systems for both engines are identical and both are supplied with oil from a reservoir formed in the gearbox casing. This reservoir also supplies oil to the propeller governor unit.

Each engine is controlled by a single lever linked to a servo control unit which automatically coordinates the output of a variable stroke fuel pump, the reaction of a barostat, and the propeller governor, to give the required power output for the condition of flight. Both engines have their own starting system, each system supplying the two igniter plugs in two of the combustion chambers, these chambers being intercommunicated by flame propagation tubes. One igniter will initiate combustion satisfactorily so that the second serves as a reserve. Booster coils energize these plugs, and a separate booster pump connected to a separate starting tank gives the necessary fuel flow.

The Coupled Naiad is designed to be mounted by the central main support plate of each engine, and the sections of the engines are thereby suspended from this plate on a cantilever principle. The method of construction employed allows any one section of the engine to be easily dismantled without unduly disturbing another.

Autopositive Cloth

Conventional negative step used in making cloth reproductions of engineering drawings can be eliminated by use of Kodagraph Autopositive Cloth, a new photosensitized cloth developed by the Eastman Kodak Co., Rochester, N. Y. Like other Autopositive materials, Kodagraph Autopositive Cloth produces a positive copy directly from a positive original drawing. It may be handled in normal room light and is exposed on conventional blueprint or direct-process machines or a vacuum printing frame.

Not only does elimination of the negative result in savings in time and materials, but also produces a cloth reproduction free from the distortion introduced by the use of paper negatives. The new cloth is highly translucent, assuring rapid production of quality shop prints, and may be drawn in on either side, using ink or pencil. It is available in 30- and 100-ft rolls in widths of 20, 30, 36 and 42 in.

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Lower Unit Fuel Consumption

(*Continued from page* 35)

mum tool change. Let us assume an L-head engine, Fig. 5, and that we want to change this engine to give a wider range of performance in power and fuel consumption. We should desire:

(a) Increased breathing, changing intake valve from 1¾ in. diameter to 2¼ in. diameter with manifolds to suit.

(b) Increased thermal efficiency by increased operating temperature and increased compression ratio to about 8.5 to 9 to one with 78 to 80 octane fuel.

(c) Minimized shock by controlled rate of pressure rise by volume distribution and mixture stratification.

(d) Minimized detonation by adequate heat transfer at the last gas area to burn plus a partially stratified mixture that would provide a minimum of explosive mixture when the last gas burns, requiring a minimum of heat transfer.

The first move would be to convert the L-head to F-head using all the old engine parts including the cylinder block but excepting the cylinder head as in Fig. 6. The intake valve now is in the head, just in front of the normal quench area over the piston. The exhaust valve is in the block and 85 per cent of the coolant should be forced around these valves and the velocity of the coolant should be increased up to the free flow capacity of the radiator. The spark plug in the cylinder head should be located so as to receive the cooling capacity of all the coolant that flows past the exhaust valve, baffles being provided to insure this, and the head should be aluminum. It is unfortunate that coolant flow and cooling are geared to the crankshaft speed instead of to the work being performed. This could be overcome if the fan and water pump were exhaust driven. This would save power, fuel and give a balanced cooling. However, such design advances are for the bold only. We should increase the thermal efficiency by increasing the mixture temperature at part throttle and increasing the wall temperature of the engine to cut the heat loss. Both will affect the initial temperature, cut down ignition lag and allow a leaner mixture to be used without missing for part throttle. Or we may increase our wall temperature considerably and vaporize the fuel inside the combustion chamber over the exhaust valve. The fuel could be injected into the combustion chamber near the end of compression stroke and would be directed at the spark plug and the exhaust valve, thus providing not only cooling of the hot spots but also a graduated mixture ratio as indicated in Fig. 7, which shows extreme leanness in the detonating area and richness in the ignition area. The total fuel to air under such conditions can be equal to a very lean mixture for part throttle, perhaps 24 to one or even leaner, and further we may find that with a non-detonating mixture where the last gas burns we can raise the compression ratio of the F-head far beyond our present expectancy. Surely this makes up an interesting and practical investigation program.

Minimum combustion shock must prevail and this can only come by virtue of a controlled flame front area progression, as recommended by Janeway, minimum full throttle turbulence, and leaner mixtures as the flame front progresses. The F-head combustion chamber shape lends itself best to shock control by internal volume and mixture distribution. However, to bring all of this about we must consider injection, which heretofore has been an expensive means to an end.

Fig. 8 indicates a type of injection that could provide our required fuel jet direction control and could be in-

(*Turn to page* 60, *please*)

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expensive. There are probably others. Here we see the injection mechanism is in the valve stem, in our case the intake valve stem. This is an old general principle and was shown in an outdated patent in 1931. However, we can use the valve stem movement as a primary pump that charges the injection system under a predetermined pressure and a small metering plunger which would be a needle selected to fit in a lapped hole in the top of the valve stem. The stroke of the metering pin can be varied to suit the load or throttle position. The ratio of air for the part throttle may be so controlled as to provide higher relative compression "pressure" than is normal for part throttle with a carbureted engine. Since stratification is limited we should not reduce the overall flexibility. Further, in dealing with piping for air only, a greater difference in air temperature for part throttle and full throttle can be provided. This again would improve our ability to burn lean mixtures at part throttle and help our control of full throttle detonation.

All efforts to obtain better performance and fuel consumption by raising the compression ratio must deal with the fact that engine or combustion roughness is the ever present potential tenant, always ready to take over. We must re-emphasize this. Ricardo and Janeway very early in their work reported that when the compression ratio was raised or any other means of decreasing the flame time was incorporated the engine could be rough. Janeway brilliantly pinned this down to the increased rate of acceleration of the pressure rise. He gave us a method of controlling this through volume distribution about the point of ignition wherein the flame front after an adequate early sharp increase would decrease progressively. This principle we illustrate in Fig. 9, "A" and "B," where "A" shows a conical chamber with the ignition point at the base of the cone which provides after a fast start a diminishing rate of pressure rise. "B" shows the reverse with ignition at the apex of the cone, the mixture burning at an ever increasing rate thus the pressure rise is rapid and roughness or shock would ensue.

In order to dispel any thoughts that the shock is academic we refer to Janeway's valuation of shock in a smooth and rough engine, AUTOMOTIVE INDUSTRIES, page 34, Aug. 1, 1949. We find here the rather sobering fact that the forces we are dealing with in the average engine at six to one compression ratio are 93 million psi per sec^2 for a smooth engine and 567 million psi per sec^2 for a rough engine. The only difference between the two engines physically is the shape of the chamber; no difference in cost or weight. These facts have been before the industry for many years and it would seem that this technique would be included in all engines. But no, many present engines are combustion rough. A few years ago this author interviewed a chief engineer whose engine in our opinion could stand a little modification for roughness. We pointed out the above data and principles and he said, "Oh, I tried that and it made the engine rougher." Such is the attitude upon which stagnation grows.

The Janeway figures given above deal with speeds below 2000 rpm and around six to one compression ratio. At higher speeds and compression ratios trouble comes fast, since conditions in the chamber are more and more turbulent as speed goes up, and hence flame progress is much more rapid and the acceleration of the pressure rise is tremendous. We may all well begin to wonder why the engine just does not blow up. The reason it does not is that the piston with its inertia that increases with speed squared is trying to come out of the top of the engine, at about the same time the rate of pressure rise effect is at its maximum downward, the net result being a very much lowered kinetic blow on the crankshaft and its supports. There is an important point of no return here, a piston can be too light. This piston effect can be felt in most rough engines as we approach top speed and the engine smooths out. In our own experience we have found in certain engines at certain high speeds that with an

iron piston the engines can be smoother than with an aluminum piston. This point is entered here as a kinetic fact, not as a design suggestion.

This author had an opportunity to analyze an engine for shock by instrument over the speed range and Fig. 10 indicates the shock factor over the range with and without the piston inertia effect. The full lines are for a rough engine of seven to one compression ratio and are instrumented. It will be noted how the roughness factor decreases after 3500 rpm.

Today we are discussing up to 12 to one compression ratio and that means that the shock factor for a given shape of chamber will be something to reckon with. In present engines our pressure rises from 160 psi at time of ignition to about 525 psi at maximum pressure without detonation while the crankshaft rotates 35 deg or about a tenth of a revolution. With 12 to one compression ratio the pressure rise must move from 200 psi at time of ignition to 725 psi at maximum pressure without detonation (we hope) while the crank rotates about one-twentieth of a revolution. This equals more than five times the shock factor of present day engines. Discounting this to three times, which is perhaps too low, we add this result to Fig. 10. Now we can see that the shock is terrific for high compression, particularly if we bear in mind that at below 2000 rpm and seven to one compression ratio this factor would represent better than 500 million psi per sec^2. This shock factor can be reduced from three to six to one by combustion chamber shape and therefore to ignore it would be short sighted to say the least. The correction of shock by shape may still not be sufficient and where possible additional rigidity must be added. However, this rigidity must be added without increasing the mass. This is a Janeway "must" since if the mass goes up so do the restoring forces, and the roughness may continue. With new engines this calls for shorter stroke engines, hollow crankshafts, more bearings, and the lightest possible flywheel.

In addition to shock control by chamber shape and rigidity of structure we now introduce the possibility of a flame speed control through another element, a partially stratified mixture. This offers a pressure rise control based on feeding less fuel as we progress, which added to Janeway's control by feeding less mixture as we progress, should give substantial roughness control.

Elimination of ignition lag is important since it gives us the opportunity to use these controls. If we don't know when the pressure rise starts we cannot but estimate the events to come.

Corrosion or erosion must be considered soon. This has been a problem in Europe for many years. With higher compression, small elements of bore destruction may affect the ring operation in a large way and call for reboring much sooner than in the immediate past.

It is interesting that all the investigators of the corrosion problem finally produce evidence that the operating temperature is a controlling factor. It is, likewise, interesting to us that operating temperature is an effective factor in engine power and fuel consumption. It would seem that development work is ahead for us on the fundamentals of engine progress based on greatly elevated operating temperatures. This was in evidence around 1923 when so-called "steamcooling" was the development mode. With air-cooled engines for the military the elevated working metal temperature must be dealt with whether we like it or not, and undoubtedly we shall have a reservoir of technical knowledge from the work that will go on in the development of air cooling for the military to meet the extremes of heat and cold.

The liquid cooled vehicle engine today operates in a vale of fears, since water has both hot and cold limitations and an alcohol water mixture like the desert Arab silently steals away, even though it rattles its vapors as a warning, and glycerine loaded anti-freezes sometimes penetrate poor gaskets and do fantastic things to the bores, pistons and rings. Since vehicles now must range across

the continent through a wide spread of temperatures and altitudes, trouble may be around the next turn in the road. Here is a wide gap in progress that must be filled in.

To summarize the above:

(a) Fuel consumption must be lowered for the engine unit requiring that this problem be tackled seriously by the American automotive industries.

(b) A program is needed that will show how this can best be done by engine design wherein such design may bring about a degree of immunity against detonation, shock and higher operating temperature.

(c) That control of internal heating and internal cooling can provide a degree of immunity.

(d) That F-head engines can be a sound intermediate step, particularly if combined with a partial stratified mixture.

(e) A single valve engine covers most of the requirements inherently.

Australian Car

(*Continued from page 27*)

the Melbourne assembly plant.

A complete heat treating department, planned and equipped on Allison lines, has been provided within the machine shop. Another area of the same plant, fed by overhead conveyor lines, handles the shipping of engines and mechanical components to the assembly plants in the other Australian mainland States.

Holden all-steel bodies, also all pressed metal parts, are produced in the new 55-acre body-building plant at Woodville, Adelaide, South Australia, and sent by road, rail, and ship to the interstate Holden assembly plants. New Woodville expansions to facilitate Holden production include new body-assembly, welding, and paint shops. The conveyor-line paint shop, said to be the most modern in Australia, is arranged so that bodies are rust-proofed, undercoated, primed, and painted in that sequence.

With these two new plants and the other assembly plants, GMH estimates that production will be 80 cars per day by March, 1950. This figure was anticipated for December but due to a coal strike the daily production peak for 1949 was only 64.

MEN in the NEWS

(*Continued from page* 21)

ment has been made of the appointment of **Leon A. Blum** as Sales Manager of the San Francisco Plant.

Northrop Aircraft, Inc.—**J. W. Hinchliffe** has been made Director of Materiel.

Dearborn Motors Corp.—**Ray D. Michaels** has been promoted to Asst. Comptroller and **H. F. Froehlich** has been made Asst. Purchasing Manager.

Huck Manufacturing Co.—The promotion of **Robert N. Hendrickson** to the position of Vice-President in charge of Sales Engineering and the appointment of **Frank A. Dobbs** as Vice-President in charge of Sales, has been announced.

Minneapolis-Honeywell Regulator Co. —**James H. Binger** has been elected Vice-President and General Manager of the Belfield Valve Div. (Philadelphia). **Colonel Frank R. Cook** has joined the company as Director of Aero Engineering.

Pennsylvania Salt Mfg. Co.—**Hugh C. Land** has been appointed Production Manager.

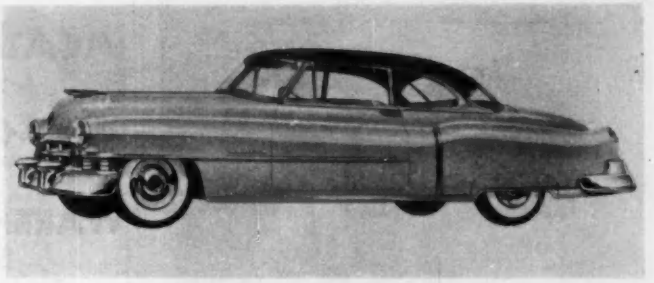
American Iron and Steel Institute—**Greswold Van Dyke** has been appointed Executive Director of Stainless Steel Producers—an organization for further development of uses of stainless steel.

The Four Wheel Drive Auto Co.—**Richard Milbauer** has been appointed a Director of the company.

Continental Motors Corp. — Separation of its domestic and export distributor sales and service groups has been announced. **Howard T. Conrey** has been appointed manager of the domestic distributor sales and service division, with headquarters in Muskegon, and **A. S. Bolthouse** is manager of the export distributor sales and service division.

Clark Equipment Co.—**Louis C. Upton** has been elected a Director succeeding **Ezra W. Clark,** deceased. **G. E. Arnold** was elected to the combined office of Secretary and Treasurer; **L. L. Lyon** was elected Vice-President in charge of Labor Relations and **H. D. Nelson** has been appointed Comptroller.

Circo Products Co.—**John F. Black** has announced his resignation as President and Director. **Joseph W. Powell, Jr.,** was elected President and **Fenton M. Davison,** Vice-President.



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